THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. APRIL 27, 1899. CHICAGO, ILL. NUMBER 17

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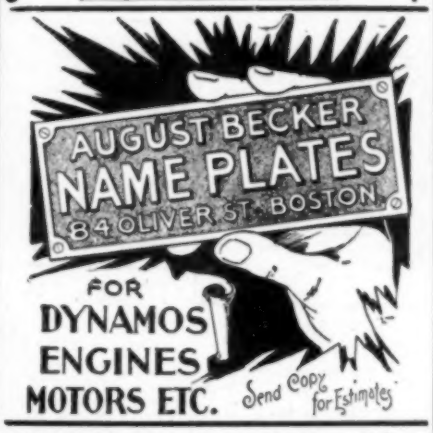

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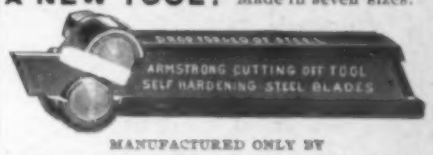

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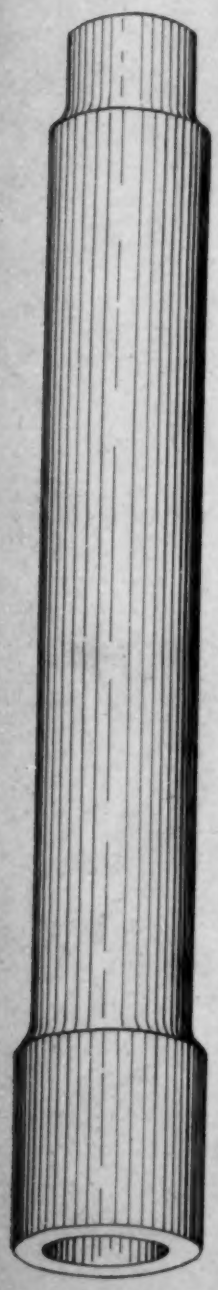

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. APRIL 27, 1899. CHICAGO, ILL. NUMBER 17

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Big movements in the iron trade have been in the air the past week. By the time this is read some of them may have become facts. Their significance is paramount. They show that control by a few large corporations is not only the destiny of the iron trade of the country, but is practically its condition to-day; and that movements just ahead will mean further dominance by large corporations. Greater certainty of profitable prices year in and year out, and of harmonious action by the few large interests, is to result from the deals now under way. The only apparent element of uncertainty is that growing out of the $15,000,000 steel works project at Buffalo. While on the face of it this may promise conflict, its final form may give ample guaranty of peace. Meantime the trade is even more bewildered than at any stage of the consolidation campaign, appreciating fully the fact that a single day's developments may be of far-reaching significance. In iron ore alone the changes of the week and those under discussion would absorb the attention of the whole trade under ordinary conditions. The Oliver Iron Mining Co. turns out to be the purchaser of the Lake Superior Iron Co. property, the leading steel producer of the country becoming also the country's largest single producer of iron ore. The Oliver one-sixth of the Carnegie-Oliver ore, as noted elsewhere, goes to the National Steel Co. on a 20-year contract, and the latter company acquires the Rosena Furnace at New Castle, Pa., and the Oliver coke and coal properties. No noteworthy change in markets has taken place in the past week. The volume of new business is quite below that of shipments from mills, but when it is known that in some lines orders on hand will occupy capacity almost to the end of the year it can be appreciated that manufacturers of finished material are very glad of the market's waiting mood. Plate mills at Chicago and Pittsburg will be able to care for very little new business before December. Buyers in all lines find less ground for expecting lower prices, as the season advances. Bridge work is very active; in building there are some signs that present prices will hold back some operations; yet structural material, if other prices hold, is still short of its relative position. A feature that will be more and more noticeable is the lessening prominence of billets as a market factor, under the amalgamations of consuming interests. Steel is strong-er in Pittsburg, and $26.50 has been reached this week on prompt lots. The pig iron market shows great strength, and after several weeks of quiet there has been a renewal of buying by consumers who found more evidence of a possible scarcity in May and June than they were willing to concede a few weeks ago. Taking the market in its length and breadth, there is nothing at this juncture to encourage expectations of any material change in prices for some months to come.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World*,
705 PUBLICATION BUILDING, April 26.

It is claimed in some quarters that the iron and steel market has shown some signs of weakness in the past week, but these claims are not borne out by the actual facts. The market is a waiting one, and the absence of transactions at present is not necessarily an indication that when the business comes to be placed, it will be on a lower basis than that now ruling.

The really important feature of the situation at the present is the influence which will be exerted on all finished lines owing to the concentration under a few managements of the interests which have heretofore been close competitors in times when there was not, as there is at present, sufficient demand to go round. The close alliance which has been made in a number of cases between steel production and consumption has greatly reduced the amount of competitive raw steel which will be on the market. The important steel producing interests are now so few in number, that, bearing in mind the fact just mentioned, it need not be expected that competition in steel will ever again be what it has been. The removal from the competitive field of those who alone were able to make very low prices, will leave the market, in time of depression, to be fixed at the prices at which those concerns which are outside of the large companies, and are at the same time outside of the field of economical production, can afford to sell their material without suffering actual loss. This will mean higher relative prices at all times than have heretofore ruled under similar conditions as to demand and supply. The policy of controlling production and manufacture from the raw material to the finished product, which was set on a large scale by one company, because it alone had the requisite capital, is being followed by the new corporations. In the excitement of the hour the outside does not seem to have realized the opportunities presented these large corporations for reducing costs of production, nor the certainty that they would in the fullest measure avail themselves of the opportunities, as a preparation for the times of depression which are periodic in the iron business.

With the reduction in competition already assured, the increasing control of raw material and the combination under one head of the progressive stages of manufacture, and a presumptive understanding among the few large concerns, the iron trade is assured at all times of very much steadier prices than have ruled in the past, and these prices will be mainly on the finished products instead of the cruder materials. A considerable quantity of formerly essential timber in the trade will be dropped. The broker, the traveling man, and many officers, will be less and less needed.

PIG IRON.—The pig iron market is without notable change from last report. While the price of pig iron is well main

tained, there have been no transactions of importance. In foundry and mill iron there have been occasional sales, and the market is not settled as to prices, which on the average are as last reported, and we continue to quote:

Bessemer, valley furnace	$14.50
Bessemer, Pittsburg	15.15 to 15.25
No. 1 Foundry	15.75 to 16.00
No. 2 Foundry	15.50 to 15.75
No. 3 Foundry	15.00 to 15.50
Gray Forge, valley furnace	14.00 to 14.50
Gray Forge, Pittsburg	14.25 to 14.50

STEEL.—The billet market becomes of less and less interest. For nearby deliveries sales at $2.50 remains the standard, while for deliveries in the second half of the year, it would require a rather tempting offer on the part of the would-be-purchaser to effect a transaction. The disinclination on the part of the producers to talk business for the second half of the year is most pronounced, and is probably due to negotiations which may lead to decidedly definite arrangements as to the disposal of practically all the steel which now makes the open market.

FERRO-MANGANESE.—There is no change in this line, the market being strong at $75 for 80 per cent in large lots, ranging up to $85 for small quanities.

RAILS AND TRACK MATERIAL.—There is practically no rail tonnage being booked, but the quotation of $25 for heavy and light sections down to 25 pounds to the yard still remains the market. In track material there is a very heavy demand, and we quote as follows: Spikes, 1.80c to 1.90c; track bolts, 2.20c to 2.40c; splice bars, 1.50c to 1.70c; links and pins, 1.80c to 1.90c.

BARS.—There is a very good demand for steel bars, and prices are somewhat uncertain, due to the well filled condition of some order books. We quote the market strong at the advance noted last week, 1.65c to 1.75c for steel bars and 1.60c to 1.70c for iron bars.

STRUCTURAL MATERIAL.—There is a heavy tonnage of structural material in sight and being booked, at prices formerly ruling, as follows: Beams and channels, 3 to 15 inches, 1.50c; 18 to 24 inches, 1.60c; tees 1.55c; zees, 1.50c; and angles, 1.50c to 1.55c; universal mill plate, 2c.

PLATES.—The vacant capacity between now and July 1, claimed some time ago to be very small, has sufficed to take care of all requirements where the price could be paid, and a limited tonnage can still be booked. One or two producers are, however, practically filled up, even beyond July 1. For delivery between now and then, the lowest quotation on tank is 2.10c. and for special deliveries 2 20c or even 2.25c is quoted. Beyond July 1 the market is easier, and for a favorable delivery 2c could be done, and perhaps a trifle better. We quote for delivery in the second quarter: Tank, 2.10c; shell, 2.20c; flange, 2.30c; fire box, 2¾c to 3¼c.

PIPES AND TUBES.—The market is very strong at the advance in merchant pipe recently noted, which is above the last formal agreement on prices The appraisers are busily at work on the various plants, and accountants are going over the books of the different concerns for the last ten years. The preliminary work is being done in a very thorough way preparatory to forming the consolidation, which is regarded as certain of accomplishment. The options taken some time ago will be considered in connection with the results of the investigations now being made, and modification will no doubt be insisted upon in cases which seem to demand it. We quote prices unchanged as follows: Merchant pipe, base discount 60 per cent and additional discounts four 10's for less than carlods and four 10's and 5 for carloads, with free delivery on the latter within the prescribed territory; lap weld casing, 52½ for screw and socket joint and 47½ for inserted joint, with 5 per cent additional on carload orders; boiler tubes, 1¼ to 1½-inch, 45 per cent; 1¾ to 2½-inch 55 for iron and 60 for steel, 2¾ to 6-inch, 60 for iron and 62½ for steel, all with an extra 5 per cent to dealers.

SHEETS.—The sheet market is entirely bare of stocks, except for the small supply in dealers' hands, and the market is dull on account of the impossibility of placing orders for such deliveries as are desired. For what tonnage is being placed prices show about the same wide range as formerly quoted, about 2.75c for No. 28 common, being the minimum, while considerably higher prices have been paid in some cases. The mills will not sell to any extent for the second half of the year, being unable even to get steel sufficient for present requirements, and will enter the second half with considerable quantities of orders which should have been filled in the first half. Galvanized sheets are not so difficult to secure as black sheets, and the market may be quoted at 70 and 5 per cent off to 70 per cent off.

SPELTER.—The spelter market is practically unchanged from last report, although there have been fluctuations during the week. The St. Louis market is quoted at 6.35c to 6.40c; Pittsburg, 6.45c to 6.50c; and New York 6.65c to 6.70c.

OLD MATERIAL.—The scrap market is rather dull, but the market is unchanged at former figures, as follows: New melting stock, $13.50 to $13.75; old steel rails, long lengths, $12.50 to $13; cut, $13 to $13.50; old iron rails, $18 to $18.50; wrought iron scrap, $15 to $16; cast borings, $8, net, Pittsburg; busheling scrap, $11 to $11.50, net; car wheels (nominal), $14 to $14.50, gross; cast scrap, $12, gross; charcoal scrap, $13, gross; wrought turnings, $8 to $8 50, net, Pittsburg.

COKE.—Some small transactions have been made during the week in furnace coke, which maintains a strong position. We quote strictly Connellsville furnace coke at $1.90, and foundry and crushed coke at $2.15 to $2.30.

TIN PLATE.—The tin plate market has not seen any new developments during the past week. The tin plate company is completely filled with orders to July 1, and is not undertaking any new business prior to that date. For the second half of the year quotations are being made and the delivered price Pittsburg, is $4 for 100-pound cokes, with 5 cents advance for full weights and 5 cents decline for each 15 pounds under 100. The consumption is very heavy, and does not seem to have been affected by the comparatively higher prices ruling this year. While the advance in tin plates is heavy, as compared with last year, the percentage is about the same as that in pig iron and steel billets, and much less than in such lines as tank plate and bar steel. The indications are that the market will remain quite steady throughout the year.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, April 26.

General conditions are very much as they were a week ago. The market has been quiet, and strong, and prices are unchanged in the week. The demand for most classes of material is steady, and sales would be larger in many instances, if the mills were in better shape to take care of immediate business.

PIG IRON.—A few good-sized inquiries were received last week, and it is expected will result in sales within a week or two. Most of the business in sight is for delivery during the last half of the year; the demand for immediate delivery is of the small order variety. Sales in the week were not large or important, and it is not expected that the tonnage for the next few weeks will be increased to any extent. The furnaces are very firm in their views, and will make absolutely no concessions from the asked prices. The largest Southern producer is sold up well towards the end of the year on nearly all grades, and other furnaces are nearly as well sold. Every discernible condition is conducive to strength, and there seems to be no reason why the present prices should not be maintained for some time, with possibly advances on some grades. Quotations are as follows:

Lake Sup. Charcoal	$17 00 @ $18 00	Southern Coke No. 3	$14 75 @ 15 00
Local Coke Fdy. No. 1	15 50 @ 15 75	Southern No. 1 Soft	15 50 @ 16 00
Local Coke Fdy. No. 2	15 00 @ 15 50	Southern No. 2 Soft	15 00 @ 15 50
Local Coke Fdy. No. 3	14 50 @ 14 75	Southern Silveries	15 50 @ 16 00
Local Scotch Fdy. No. 1	15 50 @ 15 75	Jackson Co. Silveries	17 00 @ 18 00
Local Scotch Fdy. No. 2	15 00 @ 15 50	Ohio Strong Softeners	15 50 @ 16 50
Local Scotch Fdy. No. 3	14 50 @ 14 75	Alabama Car Wheel	17 50 @ 18 00
Southern Coke No. 1	16 00 @ 16 25	Malleable Bessemer	15 50 @ 16 00
Southern Coke No. 2	15 25 @ 15 75	Coke Bessemer	15 50 @ 16 00

BARS.—There is nothing new in the situation. The market is still quiet, sales last week having been limited to comparatively small lots. The demand is good, and as soon as the bar consolidation is in shape to take business it will find a large number of buyers ready to make purchases. No further information is obtainable regarding the consolidation except what has already been printed. Common iron is quoted at 1.60c to 1.75c, and soft steel bars at 1.60c to 1.65c, half extras.

STRUCTURAL MATERIAL.—No very large contracts were placed last week, and as sales were not large, the week was more quiet than has been the rule for some time

past. Deliveries on old contracts are of good volume, keeping the mills well supplied with orders. The principal Pittsburg producer is said to be full of orders for the balance of the year on nearly all kinds of steel. Quotations are as follows: Beams, 15 inches and under, 1.65c to 1.70c; 18 inches and over, 1.75c to 1.80c; angles, under 3 inches and over 6 inches, 1.75c to 1.80c; 3 inches to 6 inches, 1.65c to 1.70c. Sheared plates, 2.25c to 2.30c; universal plates, 2.25c to 2.30c; tees, 1 70c to 1.75c; zees, 1.65c to 1.70c. Small lots from stock are quoted at ¼c to ½c higher.

BILLETS AND RODS.—The local market has been quiet with no sales of either billets or rods. Prices are nominally as follows: Bessemer billets, $25.50 to $26 50; open-hearth billets, $28; rods, $32.50.

PLATES.—The local mills are full of orders for a long time ahead, and when they have taken care of their regular customers will have sold their entire output for the year, or nearly so. The demand for plates of all kinds is large, and sales from store are excellent. Several of the local stores report their stocks nealy all sold. Quotations are unchanged as follows: Tank plates, 2.25c to 2.30c; flange steel. 2.35c to 2.45c; marine steel, 2.45c to 2.55c; fire box steel, 3c and upwards.

SHEETS.—Considerable store business was done last week, but mill orders were limited in size because of the inability of the mills to meet required shipping directions in all cases. Quotations are made at 2.75c to 2.85c for No. 27 common, and 70 and 5 to 70 and 10 off for galvanized.

RAILS AND TRACK SUPPLIES.—Very little business was done in this market last week, either in light or standard rails. Quotations are higher. We quote: Standard section rails, $26 to $27; light rails, $26 and upwards; steel splice bars, 1.40c to 1.50c; track bolts with square nuts, 2.15c to 2.25c; hexagon nuts, 2.25c to 2.30c; spikes, 1.85c to 1.90c.

MERCHANT STEEL.—There is a good demand for nearly all grades of steel, and considerable orders were closed last week, nearly all of them, from store. Quotations are as follows: Open-hearth spring, tire and machinery steel, 2.40c to 2.45c; smooth-finished machinery steel, 2.45c to 2.55c; smooth finished tire steel, 2.25c to 2.35c; tool steel, 6c to 7.50c; specials, 10c and upwards.

WIRE AND WIRE NAILS.—Business has been good, sales having increased somewhat in the week, with a good demand. There have been no further advances in prices, which are as follows: Plain wire, $1.95; galvanized, No. 14 and heavier, 50c advance; Nos. 15 and 16. 85c advance; Nos. 17 and 18. $1.10 advance; wire nails, $2.10; barb wire, painted, $2.20; galvanized, $2.70. All prices are f. o. b. Pittsburg and Cleveland, and on carload shipments all rail freight is added, making a delivered price. Single carload lots are quoted 10c higher.

SCRAP.—The market is firm, and in some cases somewhat higher than a week ago Sales have not been large, and while there is a good demand for some grades of scrap, mill grades are not selling largely. Dealers selling prices are as follows:

Old iron rails, gross,	$18 50@$19 00	Axles, net	$19 00@$20 00
Old steel rails, long, gr.	13 00@ 13 50	Cast borings, net	6 00@ 6 50
Old steel rails, short	11 50@ 12 00	Wrought turnings, net	8 50@ 9 00
Old wheels, gross	16 50@ 17 00	Axle turnings, net	10 00@ 10 25
Railroad forge, net	16 50@ 17 00	Mixed steel, gross	8 00@ 8 50
Dealer's forge, net	12 00@ 15 00	Stove plates, net	9 00@ 9 50
No. 1 mill, net	10 50@ 11 00	Heavy melting steel, gr.	10 50@11 00
Heavy cast, net	13 00@ 13 25	Old iron splice b., net.	18 50@19 00
Malleable cast, net	8 50@ 9 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World*, 27 VINCENT ST., April 26.

The outlook for early shipments has improved under the warm weather of the past week and boats are on their way up; but with the best that is now hoped for the traffic will be three weeks later in opening than last year's. Ore will be loaded at Escanaba for South Chicago the latter part of the present week, and for Lake Erie ports about May 1 or 2. Wild charters from Escanaba were made at 50 cents this week; from the head of the lake the opening rate will probably be 60 cents. Some Marquette contract ore has been covered recently, but otherwise it has been a waiting game. Lake Erie docks are getting in good shape for the season's business, with steady shipments of stocked ore to the furnaces at a time when usually much is going over the docks from boats. The sale of the Lake Superior Iron Co. to the Oliver Iron Mining Co. does not change the situation for 1899, and the six boats in the company's fleet will be engaged as heretofore in carrying the ore from the company's mines, sold for this year to various furnace firms. On the Mesabi range the third railroad interest, the Hill, or Great Northern, is attracting some attention. To carry the Sauntry ore for the American Steel & Wire Co. the company must extend its Eastern Minnesota from Hibbing, Minn., or run direct from Stony Brook to Virginia. The latter route will mean the building of 30 miles more of road at the start, but gives a shorter haul to the dock at Allouez Bay, than that by way of Hibbing, and therefore will probably be the one selected. There is no indication that any change in the 80-cent rate from Minnesota mine to dock will result from the introduction of a strong third carrier.

PIG IRON.—Rather more activity has been noted in the past week, following the recent lull. With foundrymen the question has been rather one of getting necessary iron than of price, and sales are at current quotations. Some trading in Bessemer iron is reported at Pittsburg, but three are no large deals direct from furnacemen, in the week. Gray forge is still quoted $14.25 valley furnace, and Pittsburg transactions are reported at $14.50. We quote Cleveland prices:

Bessemer	$15 15	Valley Scotch No. 1	$15 75@16 00
No. 1 Strong Foundry	15 65@15 90	Valley Scotch No. 2	15 25@15 50
No. 2 Strong Foundry	15 15@15 40	Gray Forge, valley	14 00@14 50
No. 3 Foundry	14 75@15 00	Lake Superior Charcoal.	16 50@17 00

FINISHED MATERIAL.—There is a good run of orders in all lines, much of the business being in view of the active building operations Mails are very satisfactory to mills and jobbers, bringing not only specifications on contracts but new orders for current needs. A scarcity of common black sheets is noticed, mills preferring to roll galvanized, which are in greater demand at this season and which are more profitable. Some Pittsburg mills have advanced steel bars $1 a ton, 1.65c being now absolute minimum, in large lots, while 1.75c is a common quotation from mill. We continue to quote as Cleveland prices for material out of stock: Bar iron, 1.60c, half extras; machinery steel, 2c, half extras; No. 27 black sheets, 3c; galvanized, 70 and 10 off. Wire nails are sold at the advance of 10 days ago—$2.10 in carload lots to jobbers and $2.20c to retailers in carload lots, Cleveland mill Smooth wire is $1.95 to jobbers in carload lots. Galvanized is 50 cents extra for Nos. 6 to 14 inclusive; on Nos. 15 and 16 it is 85 cents; and on Nos. 17 and 18, $1.10. Barb wire is sold at $2.20 for painted in carload lots to jobbers, with 50 cents advance for galvanized.

OLD MATERIAL.—A better demand from mills has been noticed in the past few days, after a season of waiting and there is somewhat more activity in all lines. We quote old iron rails at $18.50 to $19, valley; old steel rails $13.50 to $14; No. 1 railroad wrought scrap, $16; busheling scrap, $11.50 to $12; machinery cast scrap, $12; wrought turnings, $9; cast borings, $8; old iron axles $18.50 to $19.

CINCINNATI.

April 25.

The scarcity of Southern iron is more and more pronounced. It is not too much to say that there is scarcely an order upon the books of any Southern furnace that is shipped up to date. Practically all orders are behind hand, some more, some less, and the furnaces have not been able to catch up. The week that has just passed has seen a number of large transactions at the full current prices. The demand has been principally for No. 4 foundry and gray forge for shipment during the last six months of the year. The principal occupations of the pig iron sellers the last week has been in answering letters and telegrams and callers as to supplying iron already sold, and in explaining the true situation of the furnaces. Great inconvenience is being felt by many and changes of mixtures have been rendered necessary to enable some busy plants to keep their foundries in operation. With the largest production the country has ever known there are the smallest stocks for many years. The leading producing company of the South has of all grades but two days make in their yards. Consumers will have to exercise some patience as to a liberal supply of iron for at least two months, when the few furnaces preparing to blow in will be able to relieve the situation. The fresh augmentation will be welcome. There are ample evidences that the increased output will be needed in addition

to current make to meet the continued extraordinary demand. We quote for cash f. o. b., Cincinnati: Southern coke, No. 1 foundry, $15.25; No. 2, $14.25 to $14.75; No. 3, $13.75 to $14.25; No. 4 and gray forge, $13 to $13.50; mottled, $13 to $13.50; No. 1 soft, $15.25; No. 2 soft, $14.25 to $14.75; Lake Superior coke, No. 1, $16.25 to $16.50; No. 2, $15.75 to $16; Hanging Rock charcoal No. 1, $17 to $18; Jackson Co. silvery No. 1, $17 to $17.50; Standard Georgia car wheel, $15.75 to $16.50; Hinkle Lake Superior charcoal, $18.75 to $19.25.

PHILADELPHIA.

April 25.

The past week's transactions in pig iron indicate a brisker movement after the recent wait. Some important buyers, including pipe works, car works and mills, have been in the market for iron, to be delivered in the next six to eight months. These sales seem to establish prices on the basis of recent quotations, and there is a growing disposition to accept these as the prices likely to rule through most, if not all, of the year. Some of the furnaces that will be ready in the next two months are offering iron here and there for delivery in the second half the year at a trifle below quotations elsewhere, but this is no large factor. In general the situation is one of great firmness, as it is recognized, in view of the March statistics of stocks and productions, that if consumption should increase the possibility of even a further advance is not remote. Some consumers, however, prefer to watch the progress of events a little longer, believing that the situation cannot get away from them. We quote No. 1 X foundry iron at $16.50 to $17; No. 2X foundry at $15.75 to $16.25; No. 2 plain, $15.25 to $15.50; standard mill iron and basic, $15 to $15.25; low phosphorus iron, $19.50 to $20. There is still a stringency in steel, and on the small amount sold the price is about $27.75 and $28. Makers are all behind in their deliveries and consumers are beginning to need steel. Buyers of finished material are not anticipating their later wants and the mills appear to be entirely willing to have them wait. Prices have reached the point at which no consumer is willing to load up, the impression being that later months of the year will not show any higher level. Reports concerning the export trade are that particularly in finished lines, it is holding up beyond what was to be expected. Manufacturers of pipes and tubes report that the export trade has been an increasingly important element lately.

BUFFALO.

April 25.

The market continues quiet and strong, with an increasing difficulty to find pig iron available for such requirements as come up day by day. The prospect that two of the local furnaces will shortly find it necessary to blow out for the purpose of re-lining curtails the willingness of these companies to authorize sales until it is demonstrated how long a period the repairs will consume. Local pricesare, if anything, a trifle higher than they were two weeks ago. We quote below on the cash basis the prevailing figures, f. o. b. cars, Buffalo. No. 1 strong foundry coke iron, Lake Superior ore, $16 to $16.50; No. 2 strong foundry coke iron, Lake Superior ore, $15.50 to $16; Ohio strong softener, No 1, $16 to $16.50; Ohio strong softener, No. 2, $15.50 to $16; Jackson county silvery No. 1, $17; Southern soft, No. 1, $16 50; Southern soft, No. 2, $16; Lake Superior charcoal, $17 to $17.50; coke malleable, $16.

THE consolidation of manufacturers of plumbers' supplies is being completed this week. Davis, Stone & Auberbach, attorneys, New York, are attending to the legal detai's, and H. B. Hollis & Co., bankers, New York, are financing the deal. Francis J. Torrance, of the Standard Manufacturing Co., Pittsburg, is mentioned in connection with some prominent position with the new corporation, which will be styled the Plumbers' Supply & Lead Co.

Ferdinand W. Peck, United States commissioner general to the Paris Exposition of 1900, has informed the Exposition authorities at Paris, that he approves the plans for the buildings for the American section. Mr. Peck has also secured 6,000 square feet additional space in the agricultural implements pavilion and has requested space at Vincennes, for exhibits of machinery and electrical apparatus.

PERSONAL.

T. W. Robinson's appointment to be superintendent of the Joliet works of the Federal Steel Co., created a vacancy in the superintendency of the Bessemer steel works of the Colorado Fuel and Iron Co., at Pueblo, Col., and his brother, C. S. Robinson, who has been assistant superintendent there, succeeds him as superintendent. J. B. McKennan, who has had charge of the blast furnaces at Pueblo, has been appointed assistant superintendent. C. S Robinson graduated from the Boston School of Technology, and the two brothers were at Joliet together for a time. When T. W. Robinson had charge of Bay View furnaces, C. S. Robinson was connected with a Lake Superior iron mining company. Later he was with the Dunbar Furnace Co. He has been at Pueblo since 1892.

Andrew Carnegie sailed for Europe on the 25th His address will be Skibo Castle, Clashmore, Sutherland, Scotland. At Pittsburg last week correspondence was made public in which Mr. Carnegie offers to furnish the amount needed,—$1,750,000—to build contemplated additions to Carnegie Institute. This brings the total donations of Mr. Carnegie in Allegheny county alone up to $5,000,000, and approximately the sum of $7,000,000 the world over.

C. P. Coffin, secretary of the Minnesota Iron Co., has been re-elected assistant secretary and assistant treasurer of the Illinois Steel Co.

R. H. Palmer was recently made foreman of the foundry of the Howard Iron Works at Buffalo.

H. F. DeBardeleben, Jr., son of one of the pioneer developers of the Birmingham district, is in charge of the Clarksville, Tenn., furnace, and will put it in blast soon.

William Garrett, of Cleveland, has been appointed consulting engineer of the famous French firm of wire makers, Lazare Weiller Co., of Havre and Paris, for an extended period.

E. H. Boehnken, formerly with the Thomas Brass & Iron Co., of Waukegan, Ill., has been appointed assistant manager of the New York house of the Crane Co., Chicago.

Supt. M. McMurray, of the Joliet plant of the Federal Steel Co., is to go to South Chicago, May 1, to take a similar position. He is to be succeeded at Joliet by Theo. W. Robinson, who has been superintendent of the Colorado Fuel & Iron Co.'s plant at Pueblo since 1892. Mr. Robinson was at one time chief chemist at Joliet and later was at South Chicago and Bay View, having charge of the blast furnaces at the latter place for three years

John W. Gates, chairman of the American Steel & Wire Co., who went to Europe a short time ago to conduct negotiations with foreign manufacturers of wire and wire nails concerning prices, has cabled from Berlin, Chicago advices say, announcing the success of his mission. An agreement on prices to South American trade was reached and some shipping concessions are said to have been secured.

IT is now certain that the year ending June 30—fiscal year of the Treasury Department—will prove the most prosperous year of ship building in this country since 1891. Statistics compiled by the Bureau of Navigation for the first three quarters of the year show that during these nine months the bureau has recorded the construction of 632 vessels of 169,794 gross tons, as against 541 vessels of 58,159 tons in 1898 and 460 vessels with an aggrgate tonnage of 125,035 in 1897. The report will show that already five steel steamships for trade with the West Indies, subject to the postal subsidy act of 1891, have been built.—[Marine Review.

THE importation of Mediterranean iron ore to Philadelphia has been resumed after years of inactivity. Shipments from Elba, Bilbao, and other ports were formerly common, but for at least ten years there have not been many cargoes landed at Philadelphia. Two British steamships are now on their way to Philadelphia with several thousand tons of Med terranean ore, and a third vessel, the British steamship Leven, has been recently chartered to load for Philadelphia, the freight rate being eight shillings and sixpence per ton.

THE call has been issued for the fourteenth annual convention of the Stove Founders' Defense Association, to be held in Cincinnati May 9. The association is composed of stove manufacturers.

A Buffalo Steel Plant Project.

Rapid developments have come in the past week in a project for another great steel plant on the shore of Lake Erie. So quietly have the preliminaries been conducted that the enterprise is almost full fledged with the first public announcement concerning it. That it is not a paper plant may be inferred from the fact that already nearly $1,000,000 has been paid for the lands secured by Buffalo attorneys in behalf of the promoters of the enterprise; and it is announced that the work of building temporary docks will begin at once, the expectation being that steel can be made in the latter part of 1900. Thus far the identity of the capitalists behind the deal has been withheld in the negotiations at Buffalo; but it is known that the leading holders of the Lackawanna Iron & Steel Co., of Scranton, Pa., are chiefly interested. Buffalo capital has been subscribed to the extent of $1,000,000 to $2,000,000, it is said, and New York capital to a considerable extent. The investment talked of is from $15,000,000 to $20,000,000. One of the consolidations in the iron trade whose supply of steel from its own works is not adequate to its needs is reported to have been in negotiation at one stage of the preliminaries, for a controlling interest.

Publicity was given to the project through the necessity of securing a grant from the city of Buffalo of certain park lands that were included in the tract decided upon for the steel works site and for other lands required in connection with it. This matter came before a special meeting of the park board of Buffalo on Thursday, April 20, in the form of a resolution authorizing the sale of lands at Stony Point which had been acquired for park purposes but had not been appropriated to such uses. This adds about 20 acres to the parcels the promoters of the enterprise had already secured. It is stated that actual purchases have been made of more than 1,400 acres of land in the towns of West Seneca and Hamburg, and that when pending deals are completed more than 1,500 acres will be available. Practically all the land in West Seneca and Hamburg lying betweeen the Lake Shore railroad and the shore of Lake Erie from the Buffalo city line to the "mile limit" in the town of Hamburg has been bought for the new company. The cost of the 1,400 acres of land taken was $835,316, prices ranging from $500 to $1,200 an acre. Some of this land is low and swampy, but there are ample high lands on which to build furnaces and mills, and slag will be used in filling as fast as the operations of the blast furnaces furnish it.

The site chosen is just south of the city of Buffalo, between five and six miles from the center of the city. It includes about two miles of lake front, beginning at the southern city limit. Much of the land has limestone but a few feet below the surface and no piling will be necessary to give substantial foundations for furnaces and steel works. Temporary docks for receiving purposes will be provided by building bulkheads along recently established harbor lines and filling in behind them. Plans for permanent docks contemplate a ship canal through a long stretch of the company's property, opening into the harbor just inside the new breakwater.

Of the advantages of the Buffalo site for a steel plant, particularly in the outlet it will have for the Eastern and export trades, it is not necessary to speak at length. Ore can be delivered at the same rate as to ports on the south shore of Lake Erie, but the coke haul would be longer, if Connellsville coke were used, than to Ohio ports, like Lorain. What ore supply of its own the new company will secure is an interesting matter of speculation. The important Lake Superior properties not already in control of steel interests are now very conspicuous. To carry to Buffalo ores from the famous Cornwall mines, which the Lackawanna Iron & Steel Co. practically controls would call for a freight rate far below that now made on ore going the other way by rail, besides being very much of a "coals to New Castle" proceeding.

It is given out by the Buffalo promoters of the project that the steel manufacturers behing them will at first make billets and rails, but later will turn their attention to other products. Whether other steel manufacturers would regard with complacency a move that promises a disturbance of the present equilibrium in the steel trade of the country is a question. It is true that an equilibrium can scarcely be claimed in the shifting of interests that has been going on of late; yet the consolidations, so far as they have gone, have quite well marked out the lines of development in steel making for the future. It is an open question whether the Buffalo project is to be considered a challenge and will be accepted as such by the strong companies in the Central West, or whether it will afford practical demonstration of the purpose that seems to exist, of harmonizing the big interests and preventing destructive competition. It may yet turn out that extensions to existing plants will be deemed more advantageous to the steel trade than the building of a great independent plant at Buffalo.

Carnegie Steel Co.'s New Axle Plant.

Erection has just been commenced of a plant to manufacture heavy car axles in West Homestead, by the Carnegie Steel Co., Ltd. When completed the axle business now done at the company's Lower Union Mills in Pittsburg will be transfererd to the new plant, and the equipment in Pittsburg used for other purposes.

The building for the new plant will be 1,000 feet long, varying from 100 to 150 feet wide, providing for a continuous progression of the material from north to south. This building will contain the heating, forging, annealing and turning departments. The steel will come from the Homestead Steel Works, which are about a mile away. The billets will be heated in four continuous heating furnaces, with hydraulic charging apparatus. Roll tables will convey the heated billets to the ten steam hammers, each of 7,000 pounds capacity. The hammers will be arranged in two lines of five each. From the hammers the rough shaped axles will be taken by either overhead cranes or roll tables to the annealing furnaces, three in number, and thence to the straightening machines and lathes. There will be a total of 32 Bement-Miles lathes. From the lathes the finished axles will go to the shipping department, near which will be located the test shop, containing two drop test machines.

Outside of the hydraulic charging machines, practically all the apparatus will be driven by electric power, including the 32 lathes. In addition to the main building there will be buildings for the boiler house, engine and dynamo, pumps, test shop, machine shop, smith shop, offices, etc. The buildings will all be of brick and steel construction.

It is claimed the plant will be the largest establishment of its class in any country, having a capacity of from 80,000 to 100,000 tons of axles annually. It is expected to have the plant in operation within six months.

American Ship Building Co.

Officers of newly organized American Ship Building Co. were elected on April 20, as follows: President, W. L. Brown, Chicago Ship Building Co.; vice-president, Robert L. Ireland, Globe Iron Works Co., Cleveland; general manager, James C. Wallace, Cleveland Ship Building Co.; secretary and treasurer, C. R. Wetmore, American Steel Barge Co., New York; executive committee, W. L. Brown, of Chicago; A. McVittie, of Detroit; James C. Wallace, of Cleveland; Robert L. Ireland, of Cleveland; Luther Allen, of Cleveland; Colgate Hoyt, of New York; and W. E. Fitzgerald, of Milwaukee. Board of directors, W. L. Brown and H. H. Porter, Jr., of Chicago; Robert Wallace, James C. Wallace, H. M. Hanna, L. C. Hanna, Robert L. Ireland, and Luther Allen, of Cleveland; Colgate Hoyt, of New York; Samuel Mather, of Cleveland; W. E. Fitzgerald and Andrew M. Joys, of Milwaukee; A. McVittie, and Gilbert N. McMillan, of Detroit; W. T. Coleman Carpenter of New Jersey.

The plants acquired by the new company are those of the American Steel Barge Co., at West Superior, Milwaukee Dry Dock Co., Chicago Ship Building Co, Detroit Dry Dock Co., Cleveland Ship Building Co., at Cleveland and Lorain, Globe Iron Works Co., of Cleveland, and Ship Owners' Dry Dock Co., of Cleveland. The company is organized under New Jersey laws and has an authorized capital of $30,000,000. The actual capital, however, is $14,000,000, divided equally between common and 7 per cent non-cumulative preferred. The headquarters are to be in Cleveland.

THE United States Cast Iron Pipe & Foundry Co. has decided to have its general offices in Chicago, and headquarters will be open in that city May 1, at 425 Home Insurance Bldg.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.
G. H GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1522 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.

PITTSBURG:
705 PUBLICATION BUILDING.
B. E. V. LUTY, Manager.

BOSTON: 16 Herald Bldg. | NEW YORK: 203 Broadway.

Subscription (strictly in advance), $3 per annum. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

APRIL 27, 1899.

IRON AND STEEL PRICES OF THE FUTURE.

Reasoning that what has been will be, there are those in the iron trade who have been inclined to predict a period of reaction, if not depression, following the prosperity of to-day. This is looking some distance ahead for trouble; for in the average view, unless one's estimates of the future are to be based on the coming of the extraordinary and unlikely, calculations may be made for several years of "good times." On the cycle theory alone, if there were no present tangible and calculable influences for good at work, the starvation period of 1893–1897 should be followed by a period of plenty.

But the apprehension concerning the future of the iron trade, as it has been expressed here and there, is based upon a popular belief that the formation of consolidations in the trade will make its troubles heavier when they come. It is argued that good prices, such as consolidations are calculated to maintain, will stimulate competition; that in time the large profits some of the iron and steel consolidations are promising, and which some of them are likely to make, will bring others into the business, and that it will then be the old story of excessive capacity, over-production and a relentless struggle for supremacy. This is, indeed, the theoretical outcome; it has a basis, moreover, in experience. But there are some reasons for believing that the iron trade will not suffer from the over-multiplication of plant in the near future, or in any event from any such low prices as were prevalent at the depth of the depression in 1894 and in the reaction from the boom of 1895.

In the first place, it is not to be expected that capital will be readily enlisted for new iron and steel companies that start with the avowed purpose of fighting their way to a position in the trade, against established companies or consolidations composed of well seasoned companies. That is not the sort of investment for which capital is now looking. In the second place a company that enters any important branch of iron and steel manufacture must have large capital, and as with those already in the business on any scale, it must have its own ore and fuel supply, preferably a line of boats to carry its ores. The day when a capitalization of $100,000 to $200,000 would suffice to put down some form of finishing plant is past. There will be no bar mill, no sheet mill, no tinplate mill, no specialty mill in the future, dissociated from steel plant, furnaces and iron mines. The day of "mid-air" plants, mills suspended between heaven and earth, as it were, relying upon some other plant to furnish them foundation support, will not return. There will be no more intermediate plants—plants open at both ends—depending on some other producers for their raw material on the one hand and on some other consumer, on the other hand, to take their half finished product and turn it into final marketable form.

As to the supply of mines, taking the Lake Superior region as practically the only available one—and that is the fact to-day, whatever future discoveries may bring to light—there is this to say: the available properties of such size as would be picked by a big consolidation in search of mines can be counted on the fingers of one hand. One large group on the Marquette range and one famous mine on the Menominee range are the extent of the conspicuous properties. There are two or three of more than moderate size on the Gogebic range. But apart from these scarcely an independent mine is to be found on the old ranges that has a recent record above 200,000 tons a year. The Mesabi, after recent picking there, offers little, unless the Consolidated mines be regarded as on the market, and the most important of these has disposed of its product for the next 10 years. Therefore, viewed from the standpoint of ore supply, the lines are already well laid out for the steel industry of the United States for years to come.

As to the maintenance of prices, it has been argued that this is an easy matter in times like the present, but will prove much more difficult when demand falls off and the big producers become hungry for tonnage. As we have said before, in writing of the prospects for harmony among the big interests, it is to be said on general principles that with few to agree, chances of agreement are greatly increased, and with such vast aggregations of capital at stake the incentive to preserve peace is great. The foreign outlet for our steel has been well developed, and will save us much of the struggle for tonnage that was witnessed in the midst of 1894, when the pinched consumption at home led to a savage slaughter of prices to get business.

Most important consideration of all, which those overlook who believe that the low level of prices in 1894 can come again: Those prices were the result of a combination of causes not likely to come together again in a century. There was added to the trailing effects of the Baring failure a rapid decline in the value of silver; agitation by the party in power, and later legislation, hostile to the policy of protection under which our manufacturing interest had been built up; large crops abroad, cutting

down the demand for American wheat; an avalanche of railroad receiverships, with the destruction of much foreign capital invested in American roads; the bursting of real estate booms, with important industrial attachments that represented vast sums of borrowed money; the collapse of an over-strained system of credit; the opening up of the Mesabi range, with its revolutionary mining cost; a campaign of destructive competition among coke producers, forcing the price to an unheard-of level; the completion of modern iron and steel plants, adding largely to the country's capacity.

Here was a catalogue of concurring evils, each of which had its share in producing the disastrously low prices of the last depression. It is almost inconceivable that the iron trade of the country, with its strong organization and its well mastered economies of to-day, shall ever again come upon such a period of disaster. On the contrary, events seem to be shaping themselves, indeed—even though prices should be at length materially below those of to-day—for such a stretch of prosperity as the industry has never known.

IMPORTANT MOVEMENTS ON FOOT.

Rumor in the iron trade has been busy in the past week with talk of contemplated movements affecting in an important way two leading companies. Chicago financial columns, which have been quite well informed on developments in companies which the Moore Brothers have been instrumental in organizing, have referred to the probability that the National Steel Co., the American Tin Plate Co. and the American Steel Hoop Co. would be brought together in one organization. The three are close together now, three persons being common to their executive committees—W. B. Leeds, D. G. Reid and W. H. Moore. It is understood that an important announcement concerning the National Steel Co. will be made in the near future.

The other company whose future has been under discussion in the week is the Carnegie Steel Co., Ltd. It has been understood for some time that the company, whose partnership period expires in 1901, has been planning to incorporate as a stock company. The capitalization now is $25,000,000. Under the proposed arrangement a capital of $200,000,000 might be authorized. A new corporation act recently passed at Harrisburg and known as the McClain law, provides for the formation of corporations and for removing the limit of capitalization, which has been $30,000,000. It is believed the plans for the Carnegie Steel Co. will soon be consummated and that the personnel of the new interests that will come into the corporation on the broader basis will be such as to indicate that the big producers of iron and steel mean to preserve profitable prices and avoid conflict.

LAKE SUPERIOR IRON CO.—CARNEGIE DEAL.

The Oliver Iron Mining Co. turns out to be the buyer of the Lake Superior Iron Co.'s properties on the Marquette range, and its fleet of vessels. At Boston on Friday, April 21, the deal, pending for several months, was closed, and the Oliver Iron Mining Co. acquired 70,000 shares of the stock of the Lake Superior Iron Co. at $45 a share, par value $25. The purchaser has agreed to take the remaining 14,000 shares of issued stock at the same price. This would make the total price paid, $3,780,000. In the company's statement for 1897 the real estate and mining property were valued at $1,246,445.61 and the steamers at $600,000. It will be seen that the purchase price represents about two for one, as compared with the 1897 valuation, indicating how rapidly mining property has appreciated under the conditions of the past year or two. The Lake Superior Iron Co.'s fleet consists of the La Salle, Joliet, Wawatam, Griffin, Choctaw and Andaste, each capable of carrying close to 3,000 tons on 17½ feet. They are well adapted to the Marquette trade.

The new deal is particularly important, in view of the effort of the large consolidations to get mining property and the increasing scarcity of independent properties of large producing capacity. The Oliver Iron Mining Co. is now the largest producer of ore on Lake Superior. With the Lake Superior group added, though the Oliver company will not work the latter until 1900, the output of the Carnegie-Oliver mines will be between 4,000,000 and 4,500,000 tons a year.

The Lake Superior Iron Co. was the third to mine ore in the Lake Superior region, getting out its first ore in 1858. Its total shipments have been 8,257,714 gross tons. The output in 1898 was 686,563 tons, and the program for this year calls for about the same amount. Its mines are the Old Mine Hematite, Old Mine Hard Ore, Lake, Section 16 and Section 21. About 300,000 tons, or less than half, of last year's output was Bessemer ore. The analyses of the various ores shipped in 1898 ran as follows: Harvard Bessemer—iron, 65; silica, 3.15; phosphorus, .05; moisture, 12.48. Lake Superior No. 1—iron, 65; silica, 3.64; phosphorus, .094; moisture, 1.16. Old Mine Hematite, Bessemer—iron, 63.16; silica, 4.17; phosphorus, .067; moisture, 12.95. Old Mine Hematite, non-Bessemer—iron, 61; silica, 5.50; phosphorus, .101; moisture, 12.52. Section 16, No. 1 Bessemer—iron, 65.26; silica, 4.70; phosphorus, .022; moisture, 4.64. Section 16, No. 2 Bessemer—iron, 62.06; silica, 8.32; phosphorus, .032; moisture, 2.59. Section 21, Hematite—iron, 61.50; silica, 6.15; phosphorus, .147; moisture, 11.34.

It is expected that the headquarters of the company will be removed from Boston to Pittsburg on May 10, when the formal transfer is completed, and that as the terms of the various directors expire they will be replaced by directors chosen by the new owners.

In connection with this latest acquisition of the Oliver Iron Mining Co. the disposition of the Oliver one-sixth of the ore taken from the company's properties has been a matter of speculation in the iron trade recently. The deal pending between the Oliver & Snyder Steel Co. and the National Steel Co. has now been completed, it is understood. The remaining furnace of the Oliver interest, Rosena, at New Castle, has been transferred to the Na-

tional Steel Co. within the past week. The Oliver coke property, including 329 ovens in Oliver No. 1 and 300 ovens in Oliver No. 2 plant in the Connellsville region, is also transferred. The one-sixth interest in the Oliver Iron Mining Co. does not pass, but the Oliver share of the ore has been contracted for for a term of 20 years. This would give the National Steel Co. about 700,000 tons a year of the Carnegie-Oliver ore. Added to this, it has a one-fourth interest in the Biwabik mine, and a ten-year quota of the output of the Adams mine, under the term sales made from this property to various furnace interests, as noted in these columns some time ago. Thus the National Steel Co. has laid a good foundation for an ore supply; and the Oliver coke property and the Revere tract of 1,250 acres of coal land at Uniontown, sold by H. C. Frick to the Ohio Steel Co. and transferred by the latter to the National Steel Co., make it quite secure as to fuel.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Pittsburg Foundrymen's Association was held Monday evening of this week at the regular quarters, Frohsinn Hall, Pittsburg. The attendance was very good. M A. Moran, foreman of the foundry department of the Keystone Bridge Co., Pittsburg, was elected an associate member. There was some discussion about the financial end of the entertainment of the American Foundrymen's Association whose annual convention is to be held in Pittsburg next month. It was stated that the subscription had been coming in satisfactorily, but that considerably more money was still needed. It was pointed out that these subscriptions are being solicited from firms and companies, and not from individuals. The secretary, F. H. Zimmers, announced that there might be some who should be invited to the convention whom the secretary of the national organization would have no means of reaching, and offered to send invitations to any parties whose names should be sent to him for that purpose.

There was no regular paper scheduled for the evening, and the president announced that a general discussion would be had on any subject which might be presented. Dr. Moldenke then called attention to the system being installed in the General Electric Co.'s new foundry, of handling the sand by a bucket system, and asked for opinions as to the desirability of some such system for handling sand, in preference to the present system using scrapers, which consumes a great deal of power, and which is liable to vexatious interruption, owing to the chain breaking. He referred to the bucket system used in handling ore as very successful, and considered this an indication that it would be good for handling sand. Mr. Mathes stated that some time ago his concern had tried an automatic molding machine, which, so far as the general apparatus was concerned, was a failure; but there was used a bucket system, in connection with a trough, for conveying the sand, and this had worked very well. Working in the trough was a wooden cylinder, about 6 inches in diameter and, say, 16 feet long, with flattened spikes driven in it, to convey the sand to where it was to be used. The action was thoroughly to "temper" or mix the sand.

Mr. Moran brought up the subject of sandless pig iron, and stated that in their work (the foundry department of the Keystoe Bridge Co.) they had been using sandless pig iron altogether, and had found it very satisfactory. There were several advantages. They were unable to use the rule of ⅛-inch shrinkage to the foot, the shrinkage being considerably less than this, and, consequently, more uniform. The iron they had been getting showed a chill of, say, 1-16-inch depth, but the castings showed no chill at all, and were more readily machined. The pigs would break in two or three in unloading, and altogether the material did not have an inviting appearance, analysis having to be relied on entirely in gauging the metal. The melting ratio had been reduced to one to six or seven, showing a reduction in fuel, and there was a reduction in loss as well, the loss now being say 6 per cent, while with the old sand cast iron it was about 10 per cent. Mr. Kebler asked whether with the sandless pig iron they had to order a higher silicon, and Mr. Moran stated that the silicon analysis would be ordered the same as before. Mr. Frank asked if the sandless iron cut the cupola more, and if there was any difficulty in this direction, to which it was replied that the results were the other way. The cupola worked easier, lasted just as long, the bottom dropped more readily, and there was less lime needed, and the iron would run quicker. A great deal of their work consisted in name plates for bridges, which were rather thin, while the letters would stand out very sharp. Another class of work was sheaves, which had to have a feather edge, and this would be removed by filing later, to prevent cutting the ropes. The casting would be good, clear out to the edge, and soft enough to file.

Dr. Phillips stated that his experience in the South they found in 1895 that they could not sell a sand-cast iron for open-hearth work, and consequently began casting with the machine. The first 30,000 tons he examined closely as it was made, and there was no chilling noticed whatever. It was graded as No. 1 and No. 2 foundry. The color was a dark gray. He mentioned that a few days ago Mr. Scott had taken him to the Lucy furnaces, and they had a couple of workmen break about 30 pigs, which showed no chill at all, the grain running out clear to the edge. It required several drops from a height of 9 feet to break the pigs, and they broke with a rather dull thud rather than with a ring. He declared that the system of casting in molds was the greatest invention of the century for the benefit of the foundry trade, and was surprised the foundrymen had been so backward in actually demanding it.

Mr. Kebler said it was the fact that customers objected in many cases to iron cast in chills. He mentioned a small lot of iron which a customer had recently rejected because it had been cast in molds. It developed that this iron had been an off color, the sulphur being about .07 per cent and the silicon was .25 per cent. When dropped the pigs would break in pieces and there was a bluish color throughout. Dr. Phillips said that a sandless pig containing one-tenth silicon could not be told from dark gray foundry iron. They had made a large quantity which was guaranteed to be under 1.0 silicon and .05 sulphur, with carbon 2.75 graphitic and .50 combined.

Owing to the general interest manifested in the subject, it was thought well to devote an evening to its discussion, and Mr. Moran consented to present a paper on the use of sandless pig iron from his standpoint. Dr. Phillips was asked to contribute some statistics to the subject, covering the tonnage made under the system, and the furnaces now using it.

PRODUCTION OF WIRE RODS IN 1898.

The Amerian Iron and Steel Association has ascertained from the manufacturers that the production of iron and steel wire rods in the United States in 1898 amounted to 1,071,683 gross tons, against 970,736 tons in 1897 and 623,986 tons in 1896, showing an increase of 100,947 tons, or over 10 per cent over 1897, and 447,697 tons over 1896. The production of 1898 was the largest in our history. Nearly all wire rods are now made of steel. Pennsylvania made the largest quantity in 1898, with Ohio second, Illinois third, and Massachusetts fourth. Three other states, Connecticut, New Jersey and Indiana, also rolled rods in 1898.

The following table from the *Bulletin* shows our production of wire rods by States during the past four years:

States—Gross tons.	1895.	1896.	1897.	1898.
New England. ... } New York..... } ..... New Jersey..... }	113,603	79,733	94,471	107,311
Pennsylvania	278,406	233,352	311,6,6	417,636
Ohio.....	210,058	146,329	265,317	269,566
Indiana..... } Illinois..... }	188,863	164,572	259,372	277,170
Total.....	791,130	623,986	970,736	1,071,683
Iron	2,840	2,473	2,019	2,109
Steel.....	788,290	621,513	968,717	1,069,577

The United States still imports considerable quantities of the finer grades of iron and steel wire rods, particularly wire steel rods, the total imports amounting to 15,762 gross tons in 1898, and to 16,459 tons in 1897, the imports coming chiefly from Sweden, Norway, and Great Britain.

Review of the Technical Press.

BY DR. RICHARD MOLDENKE.

Magnetic Concentration of Iron Ores. [*Stahl und Eisen*, March 15.]—The Groendal-Dellwik process of concentrating poor iron ores has been used successfully in Pitkaeranta in Finnland. These ores are principally magnetites containing some zinc blende and chalcopyrite as impurities. After a rough sorting the ore runs between 20 and 25 per cent. in iron. The country rock is very hard and difficul to pulverize cheaply, and finally after it is concentrated it must be gotten into shape for use in the blast furnace. After experimenting many years these difficulties have been overcome and there are mills in operation and nearing completion which will eventually produce 350 tons of concentrates daily. The principal expense in the magetic concentration of iron ores is the pulverizing, for it is important to separate the grains of magnetite from the gangue to as great an extent as possible. Rolls proved to be unserviceable, for the results were both expensive and unsatisfactory. The tumbling mill was found to be excellent when the ores were dry, but as this meant special drying apparatus and, moreover, the formation of great quantities of dust, it made the question of labor a serious one, and dry grinding had to be abandoned. The final solution was found in a specially constructed tumbling mill for wet grinding. This consisted of a cast iron water tight drum lined with chilled plates and gratings. Two large hollow stems serve for charging and emptying the drum. With the ore in small lumps there is introduced a sufficient amount of water to bring about the result desired, it being found that the amount of water added regulates the size of the grain in the final slime. There is no dust, the repairs are small, the output good, and the labor item is cut in half. The wet mill requires 8 h. p., turns out 50 tons in 24 hours, is about 6 feet in diameter, and 2 feet 6 inches in width. Another mill 6 feet 8 inches in diameter and 3 feet 4 inches wide, which ground a harder and flinty ore, took 12 to 15 h. p., and had an output of only 30 tons. At Pitkaeranta there are four of each kind in operation, the dimensions of the final grain being equivalent to a cube the side of which is one-hundreth of an inch. The absence of very fine slimes allows a ready separation of ore in dressing it, which would not be the case otherwise. The magnetic separator consists of two revolving cylinders, one of which does the separating, and the other removes the ore. The separating cylinder consists of four electromagnets joined at the shaft and separated from each other laterally by brass rings. The other cylinder has eight concentric rows of two kinds of soft iron points mounted on a wooden drum. The slime is fed upon the electromagnets, the magnetic portions are attracted and the balance flows off. As the points of soft iron approach the electromagnets there is generated in them an induced current, the particles of magnetite jumping across and adhering to these points as a consequence. As they recede from the electromagnets the grains drop off and are caught in a trough. One laborer can attend to several concentrators, as the process is automatic. Twenyt-five to 50 tons are thus treated daily, and the product is really pure magnetite, 71.5 to 72 per cent. being obtained without difficulty, and less than 1 per cent of the oirginal iron contents is lost. About ½ h. p. is required and eight amperes at 35 volts are required to energize the electromagnets.

The briquetting of the concentrates gave considerable trouble. Clay, tar, water glass, molasses and lime are very good until heat is applied, when the briquettes go to pieces. Roasting the ore as part of the process, and in this way sintering it, was equally ineffective, and only after the damp concentrates were stamped into lumps and then heated did tangible results appear. A regular brick press is used for the briquetting process, and the drying oven, from its description, is practically a "Lear" for annealing glass, the movement of the material being continuous through the heating zone. The cost of this process is as follows: To treat 120,000 to 150,000 tons per annum requires a plant costing $28,000.00. If the ore is very hard this plant will only treat 75,000 tons per annum. The running cost is $14,000.00 a year, not including power, (the case in point has water power available.) If the ore carries 40 per cent. iron instead of 20 per cent the concentrates will be one-half as heavy as the ore and run 70 per cent. in iron, but the cost of concentrating is doubled. Where blast furnace gas is available the cost of briquetting is only 12 cents a ton.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held at the Great Northern Hotel, Chicago, April 19, at 7:30 p. m. Vice-president A. M. Thompson in the chair.

Those present were the following: James Frake; B. R. Marchand, Illinois Steel Co.; Hanson McDowell; C. J. Wolff, L. Wolff Mfg. Co.; R. J. Cleveland, Cleveland & Barr; C. H. Hopke, Western Foundry Co.; R. K. Thatcher, C. K. Pittman; Jas. E. Evans Theodore Kauffman, S. Obermayer Co.; A. M. Thompson, Link Belt Machinery Co; B. M. Gardner, *The Iron Trade Review;* H. S. Vrooman; E. J. Welch, A. Bolter & Sons; H. K. Maas, W. Barton, Siemens-Halske Electric Co.; W. H. Rooney, American Car & Foundry Co., Wells-French shops; A. W. Rom, with Jas. Frake, all of Chicago.

The meeting opened with a general discussion of methods to increase the interest in the work of the association among founders and to enlarge the membership. The result of the discussion was the following which was adopted: *Resolved*, That it is the sense of the association that some plan be formuulated for the controlling of prices and also for the adoption of a uniform credit system.

The chair was authorized to appoint a committee of five, of which the president of the association is ex-officio a member, to suggest a plan for controlling the prices of castings, and for a uniform credit system, the committee being instructed to call a meeting of the foundrymen of Chicago to discuss these plans, when formulated.

Nominations for officers for the ensuing year were then called for, the following names being put in nomination: For president, A. M. Thompson, W. A. Jones, C. J. Wolff. For vice-president, R. J. Cleveland, James Frake. William Ferguson. For secretary, B. M. Gardner, J. E. Evans, H. S. Vrooman, O. T. Stantial. For treasurer, R. J. Cleveland, O. T. Stantial. For directors, James Frake, A. M. Thomson, C. J. Wolff, C. H. Hopke. M. Salomon, B. R. Marchand, William Ferguson, F. G. Coffeen. For editing committee, B. M. Gardner, J. E. Evans, H. S. Vrooman, W. A. Jones, A. W. Rom.

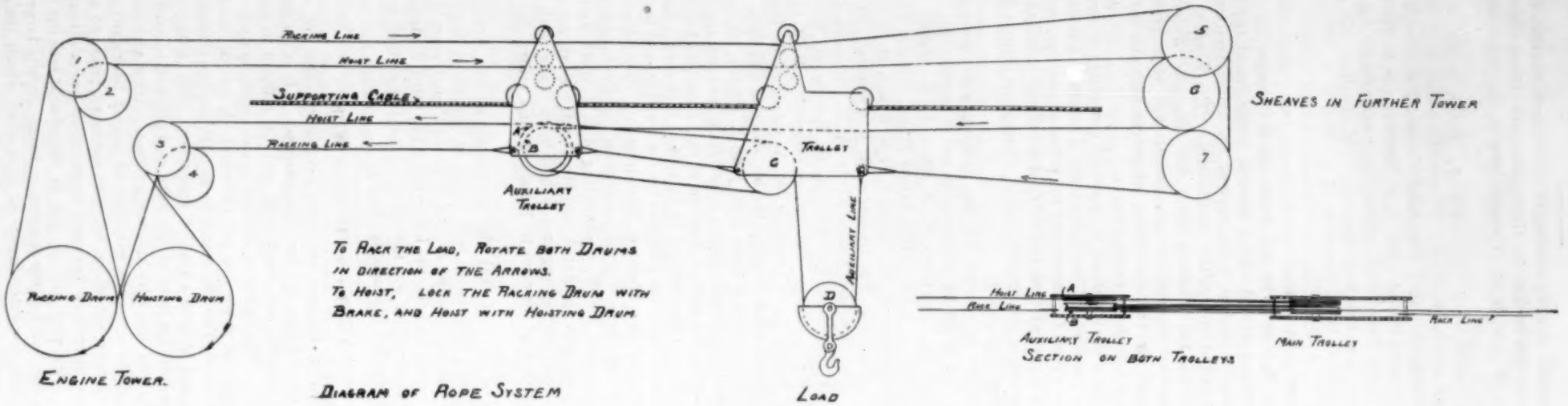
The proposed amendment to the by-laws was defeated.

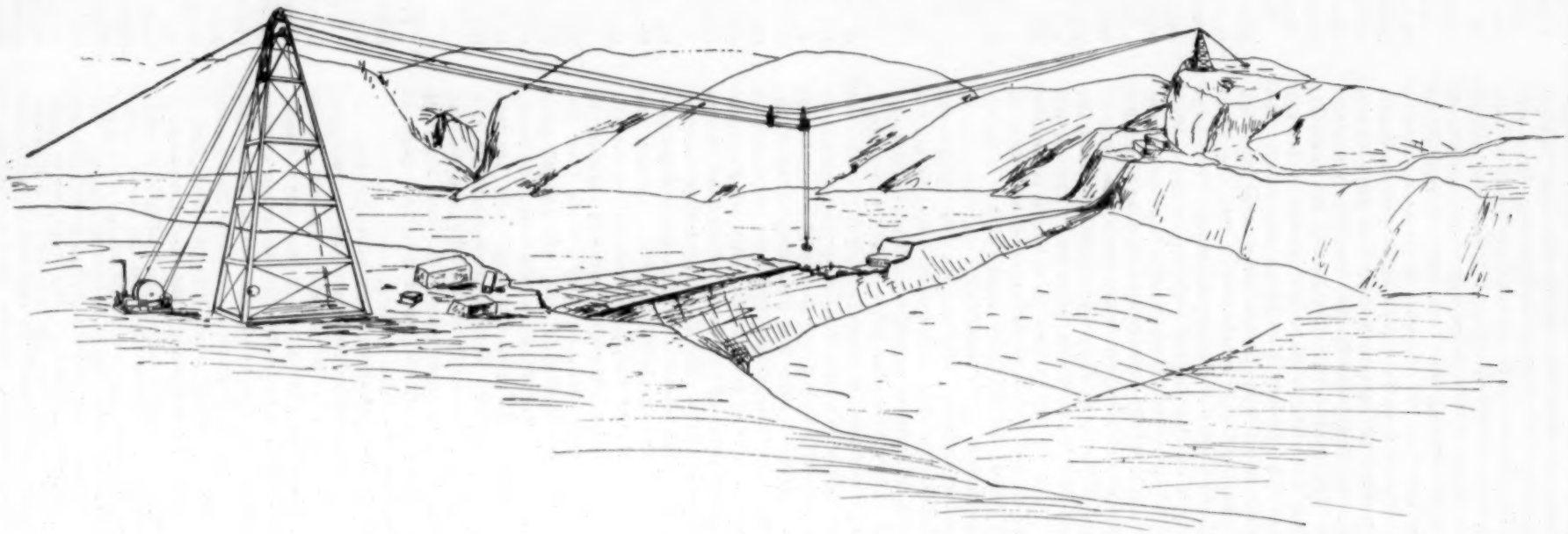
The secretary read a letter from John A. Penton, secretary of the American Foundrymen's Association, announcing that the time set for the annual meeting of that association is May 16, 17, 18 and 19, the meeting to be held at Pittsburg. Secretary Penton outlined the program for the meeting, and invited the members of the Western Foundrymen's Association to attend. A committee of arrangements for transportation, etc., from Chicago and the West, consisting of C. J. Wolff and W. A. Jones, had been appointed, and Mr. Wolff, for this committee, announced that arrangements had been made with the Pennsylvania road for rates to Pittsburg and return for the meeting.

In view of the fact that the convention of the American Foundrymen's Association will occur in the same week in which the annual meeting of the Western Foundrymen's Association would be held, the latter being the third Wednesday in May, the secretary was instructed to call the annual meeting on the second Wednesday, May 10.

Iron Screws in Stone Walls.

For securing engines and other machinery, also for wall brackets for shafting and for other purposes, it is often desirable to screw bolts into stone walls, and it is difficult to secure a firm hold. The following method is used with success. Of the originator of it we are not informed: A wire of suitable thickness is coiled on the screws so as to follow the threads of the same, and to form a kind of screw nut. The coiling may commence near the head of the bolts and proceed toward the point by laying the wire into the grooves. After arriving at the point of the screw the wire may be wound backward over the helix already wound on, but with a steeper pitch, so as to leave wider interstices between consecutive convolutions of the wire. This wire coil or nut is introduced into the hole formed in the wall for this purpose, it being slightly larger in diameter than the outer layers of wire, after which the surrounding spaces are filled up with plaster of paris, cement or similar binding material in a plastic condition. After the plaster or cement has thoroughly set and hardened, the bolt may be tightened enough to give it a proper bearing and tension.—[American Machinist.





A New Cable-way System.—Designed by H. R. Palmer, of Cleveland.

A NEW CABLEWAY SYSTEM.

The problem of conveying material by single span suspension cableways has been greatly simplified, it is believed, by a recent invention for which letters patent have been granted to H. R. Palmer, of Cleveland. The operation of the system is shown in the diagram on page 12.

The hoisting and racking lines are independent of each other, and operated by drums, which may be either of the winch or grooved drum form. For convenience of illustration, the drums are shown side by side in the diagram, but in practice they are mounted upon a single shaft, and operated by friction clutches. The hoisting drum may also be keyed direct to the shaft in many cases. Both are provided with band brakes.

The distinctive features of this system are, first, the endless hoist line, second, the auxiliary hoist line, and third, the auxiliary trolley. To trace the ropes by the diagram, start with the rack line on the drum, thence over the supporting sheave in the top of the engine tower; thence through the guide idlers in the auxiliary trolley and main trolley to the sheave 5 in the further tower; thence around 7 to the main trolley ending at 8, where the line is fastened. Beginning at the fastener 9 it goes to 10 on the auxiliary trolley. Beginning again at 11 it passes over the sheave 4 to the racking drum, thus making 9 practically an endless rope, holding the trolleys at a fixed distance apart.

To follow the hoist line, start at the hoist drum; thence around the sheave 2 to the farther tower, around 6 and back through the main trolley to the sheave B in the auxiliary trolley; thence to and around C in the main trolley, back to the idler A in the auxiliary trolley; thence to the sheave 3, and thence back to the hoist drum, completing an endless hoist line, which cannot sag.

At a suitable point in this line between B and C is attached by splice the auxiliary hoist line, operating the fall block D and fastened at 8. With the racking drum braked, thus holding the trolleys stationary, it is possible, by working the hoist drum, to raise and lower the fall block. The endless hoist line simply reeves through B and C, carrying the spliced auxiliary line in the same sheave scores.

The distance between B and C is readily adjustable and is set according to the conditions required. With a long span, and a short drop, as illustrated in the cut, showing a dam under construction, the distance B-C is about 50 feet, giving with one loop and a single-purchase fall block, a drop of 50 feet. The number of sheaves B-C can be increased, giving any desired drop, or the distance between trolleys can be increased, without increasing the number of sheaves, for use in open cutting, deep quarrying or mining.

The improvement in this device is the high racking speed, and the low cost of time and money in repairs, there being no carriers or contrivances for supporting a fall rope. The annoyances caused by these make-shift appliances are readily appreciated when long spans are attempted. The whole operation of racking and hoisting or lowering is very simple and is controlled by one man at the engine levers.

With the tracking clutch closed, the engine is started, thus carrying the load to any desired point. The clutch is then released, the rack brake tightened, and the load descends without stopping the engine. A reversal of these motions raises and transmits the load in either direction by reversal at the engine, which is of the ordinary hoist type, with link motion.

Under certain conditions a small supporting cable can be used, as the strain is largely borne by the four spans of the operating rope. The sheaves 5, 6 and 7 are then provided with equalizing spring sheave supports.

This system reduces the cost of cableway operation, owing to simplicity of construction and very high speed of transmission, there being nothing to limit this speed, with a clear track always before the trolley.

THE blast furnace employes of the Mahoning and Shenango valleys have decided to organize a district union under the auspices of the American Federation of Labor. It is announced that an effort will be made to secure an equalization of wages with New Castle and Pittsburg.

MALLEABLE IRON MIXTURES.

BY EDWIN L. GROVER.

Malleable iron after being cast, as is well known, is extremely hard and very brittle, and is known as "white iron," from the color of fracture.

The castings are tumbled in the usual way, before being annealed, in order to prevent the sand from being burned into the iron. Occasionally a casting is so fragile that in order to prevent its breaking it is pickled or sand-blasted. They are then sent into the trimming room, where they are inspected, gates chipped off, and a record made of them, after which they are turned over to the annealing room. Here they are placed in "pots," consisting of square or oblong cases piled upon each other to nearly the height of the arch in the annealing oven. The pots have but one bottom, hence castings of any length, not exceeding height of pot, with a small allowance for a covering, can be annealed in them. The castings are surrounded with a "packing" of scales from rolling mills, or something of a similar nature. It was at one time the universal custom to rust or oxidize this packing, by wetting it with diluted sal ammoniac. This was done on the theory that the casting would become decarbonized by the oxygen in the packing combining with carbon in castings. This may occur to some extent, but as a matter of fact an analysis of the annealed iron will show a big proportion of the original amount of carbon still present, but instead of being in the combined state it will be present as graphite. Hence the explanation of the annealing process seems to be this: the carbon in the white iron is in chemical combination with the iron, thereby causing it in some way to be hard and brittle. We presume each atom of carbon to be surrounded completely by other atoms or molecules of iron. By heating this "ferro-carbon" and allowing it to cool slowly the carbon changes its nature, turning to graphite, thus losing the detrimental affinity it has for the iron, or, in other words, its hardening and brittle making properties. The graphite then remaining is not, as in gray iron, grouped in crystals breaking up the mechanical or physical structure of the iron, but each atom is isolated in a cell of iron. Hence many manufacturers do not rust their packing, depending simply upon the effect of the heat.

After being packed, the pots are run into the oven, which has previously been fired lightly, by means of a specially constructed truck. The firing is then increased until the oven and its contents show a bright cherry heat. It is kept up thus from three to seven days, and then gradually slackened for several hours. The doors are then torn down, after which pots are "drawn" from furnace, and allowed to slowly cool. They are then "dumped" on floor, the castings picked out and again sent to the tumblers to have the packing adhering to them removed. The pots are placed to one side and the packing, which has gone lumpy during the process, is hammered and riddled to its former state of fineness. The castings are now delivered to shipping room, where they have to all be assorted.

One can readily see that each casting has to be handled a great many times, and these numerous handlings bring the cost of light work very much higher than heavy. A shop making heavy work, such as used on railroads, can easily produce six times the tonnage of a shop making light work, such as saddlery hardware for example, and with a much less working force.—[The Foundry.

MERCHANT & Co., Inc., of Philadelphia, New York and Chicago, report great activity in their smelting works. They operate these works on a large scale in Philadelphia and manufacture solders, Babbitt metals and newspaper metals of all grades. Their products include every class of antifriction metal of merit, running from the lowest numbered or lettered grade up to the Genuine. They also make an alloy similar to the Parsons white metal of England.

THE Union Boiler Tube Cleaner Co., of Pittsburg, has begun action in the United States Circuit Court to enjoin Gamaliel St. John from manufacturing, selling, or using a certain device for cleaning the interior of boiler tubes.

TEST OF A NORDBERG PUMPING ENGINE.*

BY R. C. CARPENTER.

The pumping engine in question is a quadruple expansion engine of the direct acting type, provided with crank and fly wheel, driven by means of links, rockers and connecting rods, from cross heads arranged between the steam cylinders and pumps. The pumps are two in number double acting, outside packed, one pump being directly beneath cylinders I and III, the other directly beneath cylinders II and IV. This arrangement brings the steam cylinders in tandem and in each case the lower pressure cylinder is arranged above the higher. The arrangement is such as to bring the strains directly on the framing and on the pump cylinders, this is accomplished by using one main bearing for the crank shaft, the center of which is in a plane passing through the cylinders and the pumps. This also is the central plane of the whole arrangement. On each side of this plane there is a set of connecting rods for each side of the machine, a set of rockers and a set of links, the engine framing being located in the center of the machine. Receivers containing reheating pipes are located between the steam cylinders.

The lowest part of the machine is a cast iron base plate which serves as a suction air chamber and as a support for the whole engine. The main engine frame rests on a substantial cast iron bed plate which is situated above the pumps, the cylinders being supported in part by the bed plate and in part by a line of cast iron columns arranged outside of the center of the engine on each side. Stretcher rods extend through the columns from the bottom of the suction air chamber to the lower heads of cylinders III and IV. The entire frame work rests on a base 11x18 feet. The total height of the pumping engine is 37 feet. The stability is such that during the tests the vibration at the top of the engine was scarcely noticeable, although the engine in some instances was operated at a speed of nearly 40 revolutions per minute.

The engine was designed for a capacity of 6 000,000 gallons in 24 hours to be delivered against a pressure of 275 pounds per square inch. The boiler pressure to be 200 pounds, piston speed 250 feet per minute. The size of the steam cylinders are 19½, 29, 49½ and 57½ inches; the plungers are double acting, 14¾ inches in diameter; the plunger rod 4.5 inches diameter, the common stroke 42 inches. The valve gears are of the Corliss type, excepting the exhaust valves on No. III cylinder which are single beat poppet valves and all the valves on No. IV cylinder which are also single beat poppet valves. The clearances of the engine as stated by the makers are as follows: In No. I, or high pressure cylinder, 128 cubic inches equal 1.25 per cent, in No. II, first intermediate, cylinder, 360 cubic inches equal 1.3 per cent, No. III cylinder, second intermediate 444 cubic inches equal 0.55 per cent, No. IV, cylinder low pressure 390 cubic inches, 0.36 per cent. The dimensions as checked by measurement are given in the table of data and dimensions following the report.

The principal peculiarity of the pump ng engine consists in the arrangement of a series of heaters through which the condensed steam is successively passed on its journey from the hot well to the boiler and in which it is warmed by steam drawn from the low pressure cylinder, the receivers and the jackets The detailed arrangement of the system for heating the feed water being as follows: A surface condenser is employed which is kept at low temperature by large quantities of injection water drawn from and discharged into the suction main. The condensed steam is delivered by the air pump into the hot well, from which it is pumped into an oil purifying tank located on the outside of the building and standing at a comparatively high level. From this tank the feed water passes to a heater in which is arranged a series of shelving over which it falls in a series of drops through the ascending current of exhaust steam from the low pressure cylinder; this heater is under the same vacuum as the condenser, and is termed the exhaust or pre-heater. The water discharged from the pre-heater is pumped into heater No. I, which is of similar construction to the pre-heater, heat being taken from the low pressure cylinder, however, for warming the feed water. The steam is drawn into the heater through a pair of auxiliary valves in the low pressure cylinder which are opened at about the ⅞ part of the stroke and after cut-off. From heater I the feed water is discharged into heater II by gravity. In heater II the feed water is further warmed by discharge of steam from receiver III. The water is then pumped from heater II to heater III, where it is warmed by steam from receiver II and by the jacket discharge from cylinders III and IV. It is thence pumped to heater IV, where it is further warmed by steam from receiver I and by the discharge of water from the jackets of cylinders I and II and the reheaters of the receivers.

The temperatures which were actually obtained by the admission of steam as described in the various heaters were as follows: Starting with the water in the outside tank at 88 degrees it is raised in the exhaust heater to 105 degrees; in heater I, to 136 degrees; in heater II, to 193 degrees; in heater III, to 260 degrees, and in heater IV, to 311 degrees. The temperature rise actually obtained was about 15 degrees less than expected by Mr. Nordberg. The various pumps required for forcing the feed water through the various heaters are compactly arranged, especially constructed for pumping hot water, and are all mechanically driven by attachment to the main pumping engine. The work of operating the pumps is included in the test as a portion of the friction of the main engine. The actual work of lifting the feed water from the point of discharge to an elevation equivalent to boiler pressure is about equivalent to lifting 150 pounds per minute against a head of 500 feet, or about 2 3 h. p. The additional work caused by the friction of the various pumps cannot be separated from the friction of the pumping engine.

The steam for the engine was supplied by a battery of Hogan boilers and kept during the test at a gauge pressure of about 200 pounds per square inch. The steam for the main engines passed through the separator, the drip of which was removed by a tank pump and returned to the boilers. During the duty test the drip of the separator was cooled and weighed for information regarding its efficiency. The various cylinders of the engines were jacketed on the barrels, and the receivers between the cylinders were provided with reheating pipes. Steam for the jackets was drawn from the main steam pipe between the boiler and the separator. The jackets of cylinder I were supplied with steam of boiler pressure, it thence passed through a reducing valve and was reduced in pressure to 116 pounds, thence into the jacket of cylinder II, it thence passed into the reheating tubes of receiver III at a pressure of 105 pounds, thence into the receiver tubes of reheater II at a pressure of 103 pounds, thence into the reheater tubes of receiver I at a pressure of 102 pounds, thence the discharge lead through a trap into heater IV. Jacket steam for the barrels of cylinder III was taken from the main steam line at the same point as the line previously described, and passed through a reducing valve which lowered the pressure to 40 pounds per square inches, it thence passed to jacket of cylinder IV, in which it had a pressure of 39 pounds, and from thence was discharged through a trap into heater No. III.

The pumping engine was constructed for the Pennsylvania Water Co., to supply water for the cities of Homestead, Wilkinsburg, Braddock and a portion of Pittsburg. A good portion of the water is distributed to towns situated in the valley of the Monongahela river, and it has to be pumped over the mountainous ridge separating the two streams. The distributing reservoir for the company is situated on the top of this ridge and with an elevation from 595 to 610 feet, depending upon the stage of the water in the river, above the surface of the Allegheny. The water supply is filtered before being pumped. Mr. James Harlow, the president of the company, constructed for this purpose an extensive filter bed by a special system in the bottom of the Allegheny river. The water is drawn to the pump from the chambers below the filter through a suction pipe 24 inches diameter and 600 feet long. During the time of the test the water in th Allegheny river was quite yellow with mud, but all traces of discoloration were removed by the filter so that the water pumped was perfectly clear and transparent.

The contract for the pumping engine guaranteed duty of 110,000,000 foot pounds per 1,000,000 British thermal units, with a daily capacity of 6,000,000 gallons, the duty and capacity to be based on plunger displacement. The contract provided that a premium was to be awarded for any excess

*Extracts from advance proof sheets of *Sibley Journal*, Cornell University, Ithaca, N. Y.

of duty. The results of the test indicated a total friction head in both pipe lines of about 3.5 feet.

Three series of tests were planned; the first to be the regular duty test of 48 hours in length, during which time all the condensed steam should be carefully weighed, pressure and indicator diagrams should be taken and the water delivered should be measured in order to determine the capacity and duty of the pump on the basis of the contract requirements. The second run to be six or seven hours duration in order to determine the duty of the pump, the economy of the engines, etc., when the feed water heaters were not in operation in order to determine the saving due to the special feed water heaters. The third run to be six hours in duration to be made with the connections so arranged that the distribution of heat to the various parts of the engine could be determined.

At 11 minutes before the end of the 36 hours, during the duty run a gasket in the feed pipe leading from the engine and near the feed pump was blown out causing a small leak. On account of this it was decided to close the duty run at the end of 36 hours, making corrections for the leak in the feed pipe for 11 minutes of time. After the repair of the feed pipe and few hours of needed rest a run of 6½ hours in length was made without the heaters in use and two days later a run 7 hours in length was made in which the distribution of heat to the various portions of the engine plant was measured.

The arrangements for testing consisted in disconnecting the pipe leading to the boiler and arranging it so that its temperature could be measured when kept under substantially boiler pressure, then passing it through a cooling coil of considerable extent by means of which the temperature was reduced to about 110 degrees, then delivering it to a receiving tank having a capacity of about 1,100 pounds which stood at a sufficient elevation so that the water could flow from the receiving tank to a bank standing on a pair of scales in which it could be weighed. The scales were carefully tested before beginning the test, all thermometers and pressure gauges calibrated and the errors of the indicator springs determined. During the heat run all the water discharged into the outside purifying tank was also weighed, the discharge from the various jackets measured, and the quality of steam between the various cylinders, receivers, etc., taken as completely as possible with calorimeters.

The general results of the duty test show the duty of the pump to be 162,948,824 foot pounds per 1,000,000 B. T. U., which the steam supplied the engine contained in excess of the feed water returned to the boiler.

The duty reckoned on the basis of 1,000 pounds of dry steam was 150,254,138 foot pounds per 1,000 pounds of dry steam. The indicated h. p. during the test is equal to 712, the dry steam per indicated h. p. per hour was 12.263 pounds, the heat units per indicated h. p. per minute was 185.96. The capacity of the engine on the basis of plunger displacement 6,225,052 gallons against a head of 602.7 feet. During the test Hook gauge readings were taken at the weir; after the test measurements were made to determine the leakage of the pipe line and pump, also of the amount of water drawn back for cooling purposes and for use of the boiler. The results of the weir test are not included in the following report for the reason that the peculiar conditions under which the weir was used caused considerable variation in the discharge head, so that further calibration will be required in order to determine the coefficient to be used for calculating the discharge. The loss from leakage was small and was determined by the rate of settlement in a basin of known area at the top of the discharge pipe. It amounted to 4.73 cubic feet per minute, or about 0.8 of one per cent, of the plunger displacement. The computations showing the distribution of heat to the various parts of the engine are at the present time not fully made.

During the test the water levels were taken in the various tanks and heaters at intervals of each half hour and computations for the water consumption on the basis of a run 12, 24, 32, and 36 hours in length, show the following results as the average steam per hour for each period. For the first 12 hours, 8,849.9 pounds; for the first 24 hours, 8,848.2 pounds; for the first 32 hours, 8.851 pounds; and for the 36 hours of the test, 8850.4 pounds.

The results of the 7-hour test to determine the distribution of the heat show essentially the same steam consumption, the amount varying by only a few pounds. The feed water temperature during the heat test was about 10 degrees higher than during the duty run, thus indicating about one per cent higher economy on the basis of the heat used by the engine. The test without the heater shows a steam consumption of dry steam of 11.4 pounds, per i. h. p. per hour, a duty of 147,525,550 pounds per 1,000,000 B. T. U. supplied and a duty of 159,824,700 per 1,000 pounds of dry steam. It will be noted from this that the effect of the heaters is to increase the duty from 147.5 to nearly 163 millions, an amount slightly over 11 per cent. The withdrawal of steam for use in the heaters, on the other hand, reduced the duty on the basis of 1,000 pounds of dry steam used by the engine in the ratio of nearly 160 to 150. This computation would indicate that the gain from the use of the heaters was not compensated for by the higher economy in steam consumption of the engine when running without the heaters, or, in other words, that there is a distinct gain in using the heat of steam which has done some work in raising the temperature of the feed water.

Ore Handling for South Chicago Furnace Co.

The South Chicago Furnce Co., capital $300,000, which recently brought the Calumet Iron & Steel Co. plant at South Chicago, has issued $200,000 bonds for the extensive improvements contempalted. It is possible another stack will be erected, to be in blast next year. The company has been working on the problem of getting ore to its plant. There is but a 10-ft. depth in the Calumet river at Irondale, alongside the furnace site, and this sufficed for the schooners that formerly brought the ore to these docks. But such craft are out of the question at present rates for ore carried in 6,000-ton vessels with 17½ to 18 ft draught. The furnace company has chartered two car ferries of the Michigan & Wisconsin Railroad Co., and these will make the trips from Escanaba. The ore will be piled in a pyramid on the decks of the ferries, the tracks remaining as they are. All that will be done will be to put in heavy braces to the sides and to the decks, which will be planked over to the height of the railroad tracks. On arriving at Irondale, cars will be run on board the ferries and the ore will be loaded directly into them by Pabst loaders. The cars will then be switched into the plant of the furnace company and unloaded. It is estimated that 2,500 tons of ore can be stowed on the decks of these ferries. With two ferries towed by one tug, 5,000 tons of iron ore can be brought from Escanaba at every trip. With that amount of ore on board the ferries will not draw more than the limit of draft at Irondale. The only question raised in connection with the plan is the behavior of the ferries in a heavy storm, but the experience of last fall is said to give proper assurance on this point.

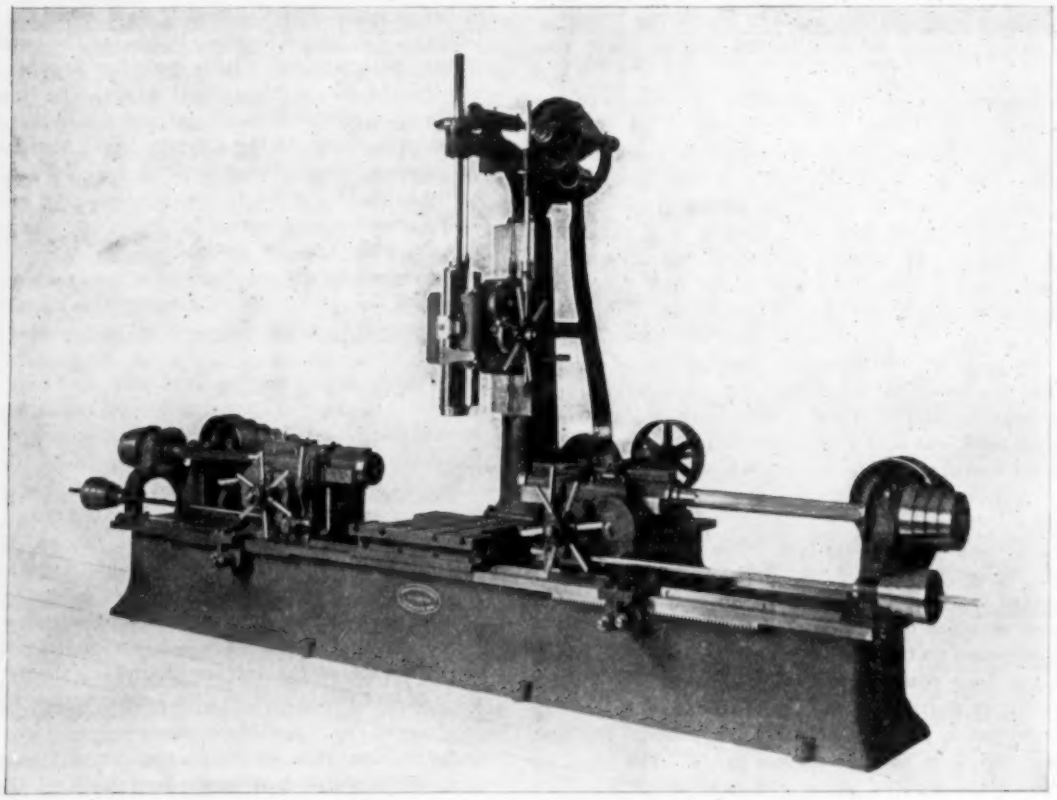
At Racine, Wis., in the case of Thos. Dunlavy against the Racine Malleable & Wrought Iron & Steel Co., the jury returned a verdict for the defendant. When the plant of the company was destroyed by fire last July, the plaintiff and others leaped from the building and received injuries, for which damages were asked. It was claimed that the defendant had not provided a suitable fire escape; the court held that the two-story building which adjoined the three-story main building, and a one-story building which was built against the two-story structure, formed a perfect means of escape for those employed on the third floor of the building destroyed. The court also held that the defendant was not liable because the plaintiff, who was acquainted with this means of escape, became too panic-stricken to use it.

On May 1st, the new 1899 catalogue of Chas. H. Besly & Co., 10 and 12 N. Canal st., Chicago, will be ready for distribution, and will be sent free post paid to any address on application. Messrs. Besly & Co., call special attention to the revised list on all metals that will appear in this book. All lists have been corrected to agree with the present market, manufacturers' lists being used exclusively. Among the additions to the catalogue are the Badger die stock set complete, Besly adjustable tap wrench, new Brown & Sharpe tools, new Starrett's tools, laboratory specialties, Gardner grinders, Teanite grinding machines and emery wheels, Pecord machinery paints, Perfection and Bonanza oil cups, and the Besly Helmet oil.

THREE SPINDLE BORING MACHINE.

The machine shown in the illustration was designed with special reference to mower frames and other castings with widely separated bearings which must be bored in line or at right angles. The vertical spindle has a transverse adjustment of 17½ inches (12 inches to the rear of horizontal spindles and 5½ inches in front). It has a power feed of 10 inches and a total vertical adjustment of 28 inches, approaching to within 8 inches of the top of the table. The horizontal spindles have a power feed movement of 14 inches and approach each other to within 12 inches, and can be separated 90 inches.

All spindles run in rectangular rams and are taper with adjustment to take up wear. The vertical spindle has No 4, and the horizontal spindles have No. 5 Morse taper holes. All have hardened steel clutches in the end to drive the boring bars. The sliding covers seen on the ends of the spindles are arranged to strike the head as the ram is withdrawn, and thus force out the boring bars, permitting a rapid exchange. The pilot wheels on the horizontal heads are loose on the shaft and have a clutch on each end. By sliding the handles in, a slow, powerful movement is obtained through the back gears for facing, etc. Pulling the handles out engages the clutch directly on the pinion shaft, thereby securing a quick return. The main bed is 14 feet long, 19 inches high, 23 inches wide, and the rear section is 5 feet long, 19 inches high and 28 inches wide. The weight complete is 12,000 pounds. The machine is manufactured by Kearney & Trecker, makers of machinery and tools, Milwaukee.



THREE SPINDLE BORING MACHINE.

Upper Lake Ore Docks.

A summary of dimensions and capacity of the iron ore shipping docks at Lake Superior and Lake Michigan shipping ports, prepared by R. Angst, chief engineer of the Duluth & Iron Range Railroad, shows that there are 20 docks —4 at Escanaba, 3 at Ashland, 5 at Two Harbor, 2 at Duluth, 4 at Marquette, 1 at Superior and 1 at Gladstone. The total number of pockets is 4,529, and the storage capacity is 672,966 tons of ore. The total length of all docks is 27,813 feet.

THE Bourne-Fuller Co., Cleveland, has extended its office suite on the eighth floor of the Perry-Payne Bldg., taking in Rooms 802 and 803 in addition.

AMERICAN MACHINERY IN GERMANY.

Consul Geo. P. Pettit writes as follows from Dusselgorf, Germany: "This consulate is frequently called upon to assist in the adjustment of annoying controversies between American manufacturers of machinery and tools and their German customers, arising from damage to goods in transit, delays in shipments, and vague contracts. These difficulties, unless guarded against more carefully, will become very serious obstacles to the progress of this important and rapidly increasing item of American trade in Germany. Damage to machinery and machine tools in transit has been very frequent, and I have just seen one shipment in which three very valuable machine tools were completely ruined, the cast iron frames being broken in several places. It is impossible to ascertain whether the damage was done by the railways in America, the steamship companies, or by the railways in Germany. Nobody seems to be responsible. It is alleged, however, by those interested that these heavy machines are subjected to very rough handling by the steamship companies. It is said that they jerk them out of the vessels with steam cranes, often hooking to frail castings which are not strong enough to sustain the weight. Before accepting damaged machines, the German buyer examines them while in the possession of the railway at the final destination, and they are also exhibited to witnesses before being taken from the depots, resulting in protested drafts, long and disagreeable disputes, and sometimes expensive lawsuits. Delay in the delivery of machines has also in several instances resulted in heavy losses. In one case, an apparatus valued at over $3,000 was to have been delivered in October, but did not reach Germany until the following February. It had been sold by a German house dealing in American machines, with the agreement that it was to be delivered in November. The result was a suit against the dealer, in which damages for about $2 000 were demanded, and, in turn, the middleman claimed similar damages against the American manufacturer.

"To prevent breakage during shipment, all machines and parts of machines should be boxed, when possible, and the cast frames bolted securely to heavy timbers. In some of these machines, there can be no doubt that the castings are too light for export without careful packing. Contracts should be made in writing when practicable, and should leave no doubt as to where the responsibility of the exporter ends and that of the German importer begins. In several cases I

have found that the American claimed that his responsibility ended when he placed the goods aboard ship in New York harbor, while the German importer alleged that the goods were to be delivered here in good condition. Much trouble will also be avoided by detailed specifications, which will prevent disputes as to particular parts of machines, and by the delivery of goods within the specified time. Special care should be taken that the bills of lading show clearly that the machines are in good order, and forwarding agents sho ld be given special instructions to carefully examine them at the seaports for cracks, bends and breaks in order that the responsibility for damages may be easily fixed. While the transportation companies can be made to pay for goods damaged in transit, the shipper will experience many difficulties in compelling settlement where all of the facts are not clear, and where claims are resisted.

"Dusseldorf, being the financial center and largest city of the great iron and coal district of the German Empire, has become the leading place in the country for the sale of American machine and machine tools, and a number of firms employing large capital are engaged exclusively in the importati n of these goods. Some of these firms—in fact, nearly all of them—remove the plates showing the names of the American manufacturers and replace them with plates bearing their own names as the makers. To avoid all of these difficulties and save the profit of the German middleman, a number of American manufacturing firms have opened permanent offices in this city, with American engineers in charge, where plans and specifications are prepared, estimates made, and contracts entered into. This system is very much more satisfactory to both the manufacturer and the German firms which buy the machines for use. There can be no doubt that many other American machine tool manufacturers could profitably increase their business by opening offices here, with competent engineers and solicitors."

Electric Power for Portable Machine Tools.

To most minds, portability in the case of a machine tool carries with it the suggestion of relatively small size, and a 48-inch slotting machine, for example, would not ordinarily be thought of as a tool of the portable type. The advent of electricity as a motive power, however, has brought some of its striking results into this field as well as into others of perhaps better-known character, and has given to some of the heavier machines shop equipments a flexibility of application which has widely extended their sphere of usefulness and has correspondingly simplified operations of hitherto awkward nature. The possibility, through electric driving, of bringing the tool to the work instead of the work to the tool has, indeed, led to a degree of economy in the handling of material which, in one of the large engineering workshops, is the immediately striking feature of the place and at once commands attention. An overhead electric traveling crane picks up a heavy slotting, or shaping machine, or drill press, or other tool of required kind, carries it the length of the shop, if need be, to the work in hand, and as promptly takes it away after its mission has been accomplished, to operate upon some other piece of work, or to make room for some other tool. That portion of the shop floor commanded by the crane is one huge work table, slotted and grooved in all directions for temporarily bolting down the tools, and the equipment in its entirety and the methods of handling it afford a splendid object lesson of evolution in shop practice. No time is lost in carrying the heavy piece of work from tool to tool to be adjusted and fastened for each separate one; it is left in its originally allotted place, to be operated upon by each tool in turn, or, preferably, by several tools at once, as is often possible, with a degree of ease, rapidity and precision which invariably is impressive.—[Cassier's Magazine for May.

"Princess Nadine," by Christian Reid, is the complete novel in the May issue of *Lippincott's Magazine*. The story is said to be among the best work of this popular writer. In addition there is a scholarly "Review of the Phillipine Question," by John Foster Kirk, author of "Charles the Bold;" a character sketch of "Phillippe de Comines," by Emily Stone Whiteley; followed by interesting papers on "The American Fondness for Movements," by Edward Leigh Fell, and "Democracy and Suffrage," by M. L. S.

MANIFOLD USES OF COMPRESSED AIR.

In a recent pamphlet of the Ingersoll-Sergeant Drill Co. an enumeration is given of the uses of compressed air to which adaptations of this power have been devised in the past few years. The list is constantly increasing. As it stands it is interesting testimony to the inventive ingenuity that has been exerted in this single field:

Air brush, air hoist, air brake, auto-truck, agitating acids, automatic fire extinguishers, acids raising or transferring, apparatus for breaking scrap iron, air jacks, aerated fuel, asphalt refining, accumulator for hydraulic hoisting service, air brake on street cars, agitating syrups in sugar refineries, air guns, air beds.

Ballast injector, baggage handler, bolt cutting machines, Bessemer converters, balloons, beating eggs, blacksmith's fires, belt shifter.

Cleaning car cushions, caulking and drilling, car lifting jack, car wheel hoist, car wheel and axle hoist, carpet nozzle, cleaning iron by sand blast, clocks, chipping tools, compressed air truck, channeling machines, coal cutters, copying presses, conveyor, cold storage, cotton compress, creating forced draft in boilers or furnaces, canal locks, caissons, clipping horses, coal or culm conveyors, crossing gates, condensed air refrigerating process, cleaning flues, cotton hauling, cleaning castings, central system of lubrication, compressed air fan.

Displacement pump, dumping cars by air, drilling and boring, disappearing gun carriage, dry dock, dust extractor, diving bells, dampening laundry work, diving armor, drainage systems, derricks operated by compressed air, ditching machine, dredging with compressed air.

Elevator door openers, elevators.

Fire alarm whistle, fire engine, flue expanders, for testing purposes in foundries, finishing silk ribbon, forcing oil, freezing quicksand, flue welder.

Granite surfacing machine, gas aerating, glass blowing, grain elevators, granite carving, grate shaking, grouting apparatus.

Horseless carriage, hammer (pneumatic), hoist geared, hydraulic cranes, hydraulic pressure relief, heating by air and oil, horse collars.

Inflating bicycle tires, in wood pulp machines, in paper mills, ice making.

Kindling fires.

Locomotive bell ringer, locomotives in mines, lifting jack, lighting lard refining, liquid air.

Motor attached to foundry crane, molding machines in foundries, motors or air engines, mixing nitro-glycerine.

Overhead trolley timber hoist, operating submarine boats, opening doors in offices and residences, oil pumping, oiling system.

Press for driving mandrels, pumping water, painting, pneumatic scrap shears, pneumatic punch, pneumatic despatch, printing presses, pumps, pneumatic guns, planers, purifying water, pile driver, pneumatic injector, pneumatic press, pipe bending apparatus, pneumatic blow-off cock.

Riveting, railway switches and signals, rock drills, rammer for foundry work, reaming, ringing chime bells, refrigerating, raising sunken vessels, raising beer by compressed air, raising and lowering furnace doors, raising stock to cupolas in foundries, removing scale from steel or iron plates, raising pressure of natural gas.

Sheep shearing, steering vessels, stay bolt hole punching machine, saws, sewing machines, sewage raising, sand blast, steam hammers, sand papering, sand sifter, street railway car, satin finish on metal work, structural iron work, spraying medical preparations, straightening press, spraying colors in pottery work, stone cutting.

Track sander for locomotive, tinsmith shears, tin ware presses, temperature regulators, tapping iron furnaces, tramways, turn table, train signal, torpedo boats, testing brakes.

Vulcanizing wood, ventilating in mines or in other places, wood boring, whitewashing.

THE *Labor Tribune*, Pittsburg, has information of an enterprise that contemplates the building of a new sheet mill in an eligibly located town that will give a bonus and five acres of land.

AIR DOMES TO SAVE PIPES FROM BURSTING.

The system recently introduced by the Pneumatic Dome Mfg. Co., of Washington, D. C., embodies an ingenious application of pneumatics to hydraulics, for the prevention of the bursting of water pipes through freezing.

There are provided at regular intervals in the supply pipes, air domes, or spaces which remain filled with air, slightly compressed by the water pressure. In these the ice, 10 per cent greater in volume than the same water in liquid state, can store its excessive bulk.

For horizontal pipes, these air domes are provided with a double inclined plane, or deflecting slope, as shown in the cut, which causes the ice to slide into the air-filled chamber, simply compressing the air, instead of bursting the pipes. For vetical pipes the principle is the same, although the slopes are not necessary, since the vertical expansion causes the ice

column to be thrust into a vertical chamber without the necessity of being deflected. An automatic air inspirator, placed in the basement of a protected building, supplies air to the domes every time a spigot is opened or closed, the air being carried along the pipe by the flowing water, and caught wherever there is a dome, thus cushioning the pipes with air just at the points at which dangerous expansion takes place.

The system has been endorsed by many engineers and architects and has been tested by a leading scientist. The several simple devices and fittings which are comprised in the system, as well as their application and combination, constitute a series of United States and foreign patents.

Galvanized Sheet Iron and Steel.

In answer to the question, whether there is any simple method of detecting the difference between galvanized sheet iron and galvanized sheet steel, and whether sheet iron or steel treated by the Bower-Barff process is on the market, the *Metal Worker* says:

"Galvanized sheets, whether of iron or steel, resemble each other very closely indeed. Probably the most ready way of distinguishing them would be by the fracture; that is, by the appearance of the newly broken sheet. Even this would require an expert, as after all the difference between wrought iron and soft steel is not very marked.

"Sheet iron and steel treated by the Bower-Barff process are not on the market, and it is consequently impossible to give any prices. Parties who use the process extensively inform us that thin sheet metal is not treated by that process, and they doubt very much whether it is practicable to do so."

American Society of Mechanical Engineers.

The 39th meeting of the society will be held at Washington, D. C., from May 9 to 12. The Arlington Hotel has been selected as business headquarters, and the professional sessions will be held at that place. The following papers will be read:

May 10, Morning.—"Standards for Direct Connected Generating Sets," J. B. Stanwood; "Boiler and Furnace Efficiencies," R. S. Hale; "Test of a Steam Separator," F. L. Emory; "Investigations of Boiler Explosions," Gus C. Henning.

May 10, Evening.—"Relation Between Initial Tension and Power Transmitted by a Belt" F. L. Emory; "Experiments on Various Types of Fire Hydrants," C. L. Newcomb; "Experiments with Deep-Well Pumping Rods," G. W. Bissell; "Pipe Flanges and Their Bolts," A. F. Nagle; "Manufacture of Car Wheels," George R. Henderson.

May 11, Morning.—"Equipment of Tall Office Buildings in New York City," R. P. Bolton; "The Central Heating Plant of the University of Wisconsin," Storm Bull; "The Power Plant of a University," E. A. Darling; "The Plunger Elevator," G. I. Alden; "Elevators," C. R. Platt.

May 12, Morning.—"The Allen Valve for Locomotives," C. H. Quereau; "Rolling Mill Fly-Wheels," John Fritz; "New System of Valves for Steam Engines, Air Engines and Compressors," F. W. Gordon.

The social and excursion program will begin with an informal reception on the evening of May 9th, in the New Corcoran Gallery of Art. The following afternoon President McKinley will receive the society at the White House. The afternoon of May 11 will be given up to inspecting the U. S. Navy Yard and Gun Factory, and a reception will be given in the evening by Mrs George Westinghouse. Mount Vernon, the Washington Monument, the Congressional Library and other points of interest will be visited between the sessions.

The World's Iron Ore Consumption.

"From the national point of view," says the London *Statist*, "it is not agreeable to find that while 20 years ago we produced 50 per cent of the world's pig iron, we now furnish less than 25 per cent. America has taken the lead since 1890, and will easily keep it. The following represents the world's output of pig iron in 1898:

	Tons.		Tons.
United States	11,774,000	Austria-Hungary	1,200,000
Great Britain	8,631,151	Belgium	980,000
Germany	7,402,717	Sweden	560,000
France	2,000,000	Spain	300,000
Russia	1,750,000	All other countries, say	402,132
Total			35,000,000

On the basis of two tons of ore to one ton of pig, this means a consumption of 70,000,000 tons of iron ore per annum. Is there a supply of ore in sight in the world to permit of an increase in the world's production of pig iron by 25 per cent? If not, it is difficult to see how the growing demands for iron and steel are to be met. But, of course, the demands may cease to grow."

A Record of Saving by Mechanical Draft.

An example of the possibilities in the reduction of fuel cost in modern boiler practice by the introduction of mechanical draft, is given in the accompanying results obtained at the United States Cotton Co., Central Falls, R. I. This record covers a period of 52 weeks.

Number of hours run		2,998
Average indicated horse-power		1,543.84
Coal.	Pounds Burned.	Cost.
Buckwheat	6,074,400	$7,316.89
Anthracite	1,173,826	800.34
Cumberland	565,906	836.00
Total	7,814,132	$8,953.27
Cost per ton		$2.29
Cost per I. H. P. per year		5 80

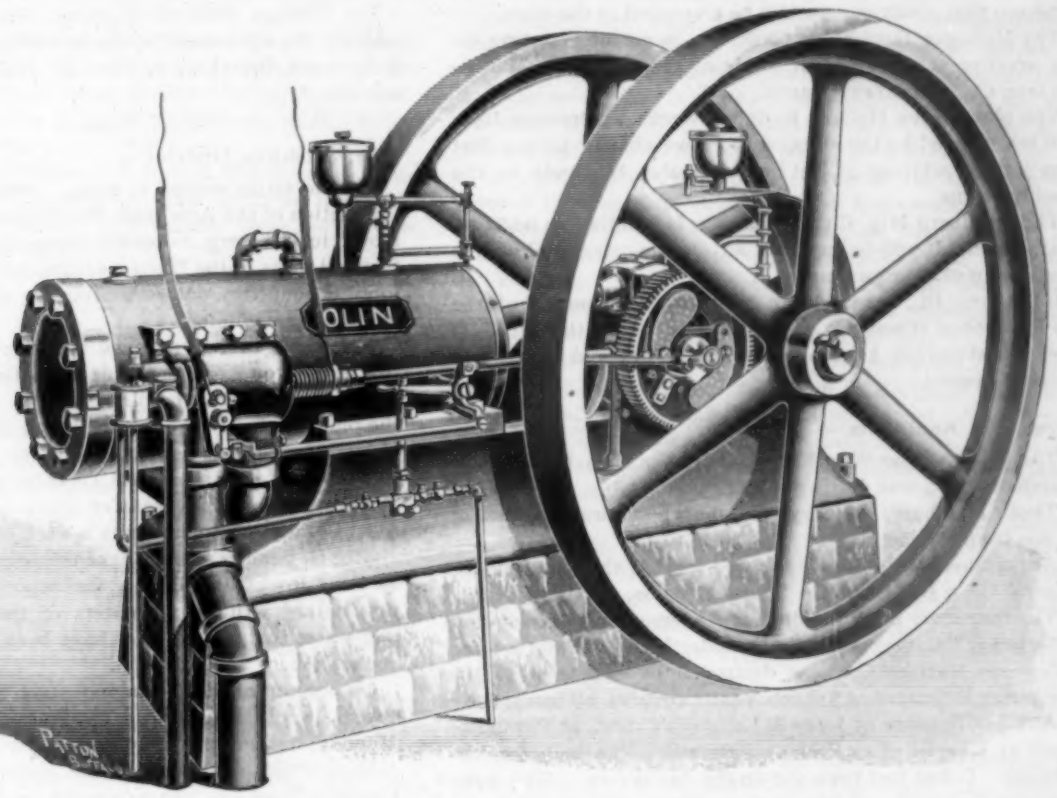
Composition of Mixture: buckwheat, 78 per cent; anthracite dust, 15 per cent; Cumberland, 7 per cent.

The plant consists of three Babcock & Wilcox boilers of 335 rated horse-power each, a total of 1,005 rated horse-power. The engine is a cross-compound Harris-Corliss, developing as will be noted, an average of 1,543.84 indicated horse-power. The low fuel cost of $5.80 per I. H. P. per year in a plant without economizers is primarily due to the employment of a low grade mixture, costing only $2.29 per ton, the burning of which has been rendered possible by the introduction of mechanical draft. The draft of the chimney previously employed lacked the intensity necessary to the free combustion of this fuel, and as a consequence it has been necessary to use Cumberland semi-bituminous coal. The installation of the fan, costing less than $600, brought about an annual saving of $6,500 in the fuel bill. The fan, which was built by the B. F. Sturtevant Co., of Boston, is provided with a direct attached engine, the speed of which is regulated by a device of the chief engineer, Thomas P. Burke, whereby a scarcely perceptible change of steam pressure immediately alters the speed of the fan, and consequently the intensity of the draft, and instantly brings the pressure back to normal. As a result the steam pressure remains almost constant.

GEORGE POWEL, of New Castle, Pa., went to Cincinnati on Monday to prepare for the convention to be held May 1 of the International Tinworkers' Protective Association, which is composed of the workers in the tin houses connected with the tin plate plants.

THE OLIN GAS ENGINE.

The first Olin gas engines were manufactured at Dunkirk, N. Y., some years ago. The business was then transferred to Buffalo and conducted for a time as a co-partnership until about two years ago, when it was organized into a stock company. A large number of Olin engines are in use in Buffalo, over 4,000 h. p. being employed in a single line. While the first Olin engines made six years ago are running to-day, yet in many details the engine has been developed to larger powers and adapted work of more exacting nature, until now the company is making installations of over 100 h. p. and putting in numerous plants to drive dynamos for incandescent lighting. Milling and elevator installations have been numerous also. Another line of service in which progress has been made is in the employment of the engine for the operation of water works pumping plants in towns and villages. The company recently installed three plants of this character. The economy is pronounced as compared with the service of an electric motor or a steam plant. In a town of 1,100 population, a water works plant has been equipped with two 25 h. p. Olin gas engines and two triplex power pumps. They pump into a stand pipe holding 105,000 gallons.



THE OLIN GAS ENGINE.

The stand pipe is 125 feet high and standing on an elevation 25 feet above the pumps, which are 15 feet above water supply. It requires 1,500 feet of gas to fill this tank. With gas at 25 cents per 1,000 feet, the cost is 37½ cents.

The governing, starting and ignition devices in a gas engine are the noteworthy features. In the Olin engine the governing mechanism and valves are on one side. The governor is so constructed as to eliminate the effect of the friction of quiescence, making it very sensitive. The governing is accomplished by holding the exhaust valve open when the speed tends to go above the normal. By this method of controlling the speed the engine is relieved of the duty of compressing idle charges when the load is light. By means of a hand wheel, the speed may be adjusted without stopping the engine.

All the engines above 2½ h. p. are provided with a special device for relieving a part of the compression when starting, so that one man can start an engine as large as 35 h. p. by turning the fly-wheels. This device does not waste a part of the explosion as is the case with the relief cock. Either hot tube or electric spark ignition is used. The hot tube is employed in most cases on account of its simplicity.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:—

The Standard Pulley & Foundry Co., St. Louis, has filed articles of incorporation, with a paid capital of $20,000. The stockholders are: Charles C. Hunleth, Frank J. Hunleth and Gustav J. Hunleth.

At Camden, N. J., the Pittsburg Machine Tool Co., filed articles of incoporation.

H. Miner Lewis, Greenivlle, S. C., wants to be put in communication with manufacturers of drills.

Sieben Manufacturing Co., Kansas City, Mo., wants prices on stamping machine lathes, head lathes, cock grinders, buffing wheels, emery wheels, speed lathes and belting, and for complete outfit for nickel plating room.

The Spartanburg Machinery Co, Spartanburg, S. C., is reported in the market for an 18x24 Corliss engine; also boilers.

A Richmond, Va., dispatch says: New York capitalists have secured a charter for a company, with $2,000,000 capital, the Richmond Standard Steel Spike & Iron Co., formed for the purpose of mining coal and iron ore, converting coal into coke, iron ore into pig iron, and pig iron into steel; also for the manufacturing of railroad spikes and all other articles of iron and steel.

New Construction:—

The Chicago & Northwestern Railroad will construct an important addition to its plant at Kinzie st. and West Fortieth ave. The plans provide for an addition to the erecting shop, 150x100 feet, and a new boiler shop, 300x120 feet, with an electric crane having a capacity of 60 tons. There will also be constructed a central power house and a 140 feet addition to the tank house. The cost is estimated at $300,000.

Work has been started on the new 80x250 feet foundry building of the Emerson Mfg. Co., Rockford, Ill.

The P &. F. Corbin Co., Hartford, Conn., is about to erect an addition 112x42 feet, six stories.

It is reported that the McCormick Harvesting Machine Co. will construct a tempering house in connection with its plant at Blue Island and Western ave., Chicago.

The Paige Woven Wire Fence Co., of Adrian, Mich., which expects to remove to Monessen, Pa., has begun the construc-

tion of its plant at the latter place. Its facilities will be doubled by the change.

R. M. Newbold & Co., of Birmingham, have secured contract for the erection of the extensions of the shops of the Louisville & Nashville Railroad Co., at New Decatur.

The Ellwood City, Pa., Gas Engine Co., a dispatch says, has been reorganized and the following officers elected: President, Hon. R. S. Blatt; vice-president, C. R. Dillenbaugh; secretary and treasurer, F. L. Bingham; directors, R. C. Stofiel, Carl R Dillenbaugh, H. L. Bingham, H. S. Blatt, C. H. Blatt, and J. J. Blatt. The company will erect a new plant to cost $50,000.

At Mattoon, Ill., a committee of citizens, appointed to raise funds for the location of a rolling mill plant, has adopted the scheme of selling lots to secure the necessary capital. So far 70 lots have been sold.

It is expected that the Erie Railroad will expend $200,000 in building a bridge and in running extensions to the Ohio Steel Co.'s plant, Youngstown, O.

The Morgan Engineering Co., of Alliance, O., has completed plans for additions, consisting of a crane shop 200x65 feet and a new foundry.

J. Campbell and J. W. Richards have secured a site at Elmira, N. Y., for the establishment of a boiler works. It is expected that about 25 men will be employed at the start.

The Michigan Detachable Chain Co., is now negotiating for the erection of a large plant adjoining the Michigan Malleable Iron Co., at Delray, Detroit.

The plant of the Holland Radiator Works, at Bremen, Ind., will be enlarged by the addition of a warehouse 50x100 feet long, and an addition 75 feet long will also be made to the machine shop.

The Nordberg Mfg. Co., Milwaukee, is building an addition 40x150 feet. It will be used as an erecting shop and will be equipped with a large crane.

Galesburg, Ill., has made an offer for the removal of the Havana Metal Wheel Co. from Havana, Ill., to that city. It is expected to raise $25,000 by the sale of lots, and to give five acres of ground.

Fires and Accidents:—

The Marshall Car Wheel & Foundry Co.'s machine shop at Marshall, Tex., was destroyed by fire.

Thos. Marshall's foundry, Pittsburg, suffered a loss of $5,000 from fire last week.

At Gardner, Mass., fire destroyed part of the plant of the Central Oil & Gas Stove Co. Loss $100,000; partly insured.

The four-story brick building at Anderson and Lacock sts., Allegheny, Pa., occupied by Alexander Beggs & Sons and the Allegheny Machine Co., was destroyed by fire April 20, the loss being estimated at $38,000, partly covered by insurance.

At Eliza Furnace of Jones & Laughlin's, Ltd., at Pittsburg, April 24, a series of explosions occurred. The bell was destroyed. It had just been put on the day before. The hoist was also damaged and repairs to the lining will also be necessary. The damage is heavy and the stack will be idle for some time.

Power Equipment and Machine Tools.

Gould & Eberhardt, of Newark, N. J., have sold to the Brown Hoisting & Conveying Machine Co., of Cleveland, an automatic gear cutting machine of 120 by 20 inch capacity, a duplicate of one recently installed at the Blake steam pump plant at East Cambridge, Mass. This is said to be the largest size of entirely automatic gear cutting machines built.

The C. & G. Cooper Co., of Mt. Vernon, O. has sold through its Western office, Edward M. Hagar & Co., managers, The Rookery, Chicago, a heavy duty Cooper-Corliss engine to drive the Morgan continuous mill being installed by the Grand Crossing Tack Co. The Cooper company is also building four engines to be connected to the 18 sheet mills being installed by the St. Louis Stamping Co. These engines are of the tandem compound condensing type with high pressure cylinder 28 inches in diameter, low pressure cylinder 56 inches, all 60 inch stroke. They will be furnished with flywheels 32 feet in diameter, weighing 200,000 pounds each.

J. B. & J. M. Cornell, of the West Point Foundry, West Point, N. Y., in conjunction with the Whitney Iron Works, New Orleans, have been awarded a large contract for sugar machinery for Mexico. The machinery will consist of three sugar rollers 60x32 inches, a crusher 26x60 inches, and engines, steam plant, etc., the whole capable of crushing 300 tons of cane a day. The plant is valued at about $300,000.

A crushing plant consisting of three 34x84-inch three-roll mills is being built by the Farrell Foundry & Machine Co., Ansonia, Conn., for a recently acquired plantation of the American Sugar Co., on one of the Hawaian islands.

The Otis Steel Co., Cleveland, has purchased a 54-inch engine lathe from McDowell, Stocker & Co. The latter company has recently shipped several machines to New York.

The Gisholt Machine Co., Madison, Wis., reports that orders for its lathes and tool grinders have never been so numerous. The company has a new building under construction. It has an especial encouraging demand from Europe.

The Morton Mfg. Co., of Muskegon, Mich., has made arrangements with Lelig, Loumenthall & Co., of London, Eng., to represent it in the sale of machine tools in England, Spain, Portugal and Italy.

The Q. & C. Co., Chicago, is working its shop overtime and is 90 days behind on most orders for machinery. It is making a large shipment of pneumatic tools to Russia and of pneumatic tools and saws to London, and to Paris.

The Chicago office of Manning, Maxwell & Moore has just sold, for the equipment of the new shops at Shickle, Harrison & Howard Iron Co., at East St. Louis, five Shaw electric cranes.

The Pittsburg District:—

An interesting exhibit is being arranged for the national convention of the American Foundrymen's Association next month in Pittsburg, to consist of specimens of foundry work from all parts of the United States, and of art castings from foreign countries. Various foundry supplies and appliances will also be exhibited.

The Amalgamated Association, which in 1890 lost all control of the iron workers east of the Allegheny mountains, has lately invaded that territory, and is gaining a foothold in the plant of the Lackawanna Iron & Steel Co., Scranton, Pa.

An advance of 10 per cent. in wages has been made for the day laborers at the plant at Canonsburg, Pa., by the American Tin Plate Co. The transfer from the Canonsburg Iron & Steel Co. was completed only a week or two ago.

Otto G. Schultz, president of the Schultz Bridge & Iron Co., McKees Rocks, Pa., denies the report that the company is negotiating with the promoters of the bridge consolidation, and states that no overtures have been made to them in this connection.

On account of the shortage of steel, the Monongahela plant, Pittsburg, of the American Tin Plate Co., did not start work Monday, but will probably resume Thursday.

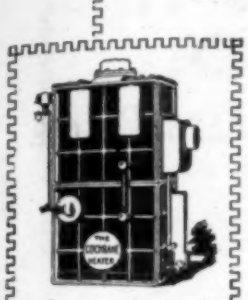
H. C. Frick, chairman of the board of managers of the Carnegie Steel Co., has purchased the Wylie farm, near Elizabeth, Pa., on the Monongahela river, from H. S. A. Stewart. There are about 260 acres, suitable for manufacturing, traversed by the Monongahela division of the Pennsylvania system, formerly the Pittsburg, Virginia & Charleston. The price was about $165,000, and the purchase was made for an investment as manufacturing property is becoming scarce in that region.

General Industrial Notes:—

The Robins Conveying Belt Co., of New York, has been awarded the contract for the oxide handling machinery of the new purifier house of the New Amsterdam Gas Co., at Ravenswood, N. Y.

The Bessemer plant of the Colorado Fuel & Iron Co., at Pueblo, Col., is reported in full blast, and every department is running. It is said that the present blast furnaces are not adequate to supply the steel departments, and that new furnaces will be built before long. The two furnaces now in operation are able to supply not more than two-thirds of the amount of pig iron needed to keep the other departments running. The mills are turning out a large order of steel rails for Chihuahua, Mex., and the pipe foundry is busy on a large order for the Florence, Col., water works. In this order are some 6,000 pieces.

The Advantage We Have.



There would not be half the market for boiler cleaners and boiler compounds that exists today if steam users would only take steps to purify their boiler feed supply before they put it into the boilers. Any water, no matter how full of sulphates, carbonates, or other scale forming matter, can be improved by passing it through a **Cochrane Heater and Purifier.**

There are other heaters which give no purification. Our COCHRANE HEATERS AND PURIFIERS DO GIVE IT—and there's one of the advantages we have.

Manufacturers of the Cochrane Separators,

HARRISON SAFETY BOILER WORKS,
Clearfield & 17th Sts., Philadelphia, Pa.

The Bullock Electric Manufacturing Co., is running its new plant at East Norwood, near Cincinnati, O., night and day. The new plant is said to be next to the General Electric Co., and the Westinghouse Mfg. Co., the largest electrical establishment in the country. All machine tools are driven with individual motors.

The plant of the Radford Pipe & Foundry Co., at Radford, Va., which, it is said was shut down by an agreement which existed before the organization of the United States Cast Iron Pipe & Foundry Co., is to be started up again under present improved prices.

The employes of the Illinois Bolt & Iron Works, of Carpentersville, Ill., numbering nearly 300, went on strike last week because the company refused to reinstate some who were discharged a few weeks ago.

The shareholders of the Bethlehem Iron Co., in session at the company office, Bethlehem, Pa., April 22, voted in favor of a lease of property and franchises to the Bethlehem Steel Co., capital stock $15,000,000. Of 88,000 shares voted at the meeting, all were in favor of the lease. The new company makes a guarantee rental of 6 per cent a year on the capital stock of the old company, which is $7,500,000, payable quarterly, free from all taxes and deductions. The officers elected by the incorporators are: Robert P. Linderman, president; Abraham S. Schropp, secretary, and C. O Brunner, treasurer. The directors are Joseph Wharton, Beaurean Borie, E. T. Stotesbury, John L. Welsh, Philadelphia; Elisha P. Wilbur, R. H. Sayre, and R. P. Linderman, South Bethlehem.

At Youngstown, O., a continuing feature of the industrial situation is a scarcity of labor, particularly for the operation of puddling furnaces.

The Kentucky Fire Brick Co., near Portsmouth, O., has notified its employes that all wages will be increased 10 per cent May 1.

At Marion, Ind., the Westerman Stewart Rolling Mill Co. has announced that it will raise the wages of all its employes not governed by the amalgamated scale 10 per cent, to take effect May 1.

A general increase in the wages of molders in the locomotive and machine shops of Patterson, N. J., was made this week.

Molders' helpers and laborers at Fraser & Chalmers' foundry, Chicago, went on strike last week for an increase from 14 cents to 17½ cents an hour.

At Dover, Del., April 22, a certificate of incorporation of the Union Steel & Chain Co., with a capital of $60,000,000 was filed. One-half of the capital stock is preferred and one-half common The company is said to have options on various chain plants. The incorporators are: W. Kaney, E. L. Harper and Maurice E. Doran, all of New York.

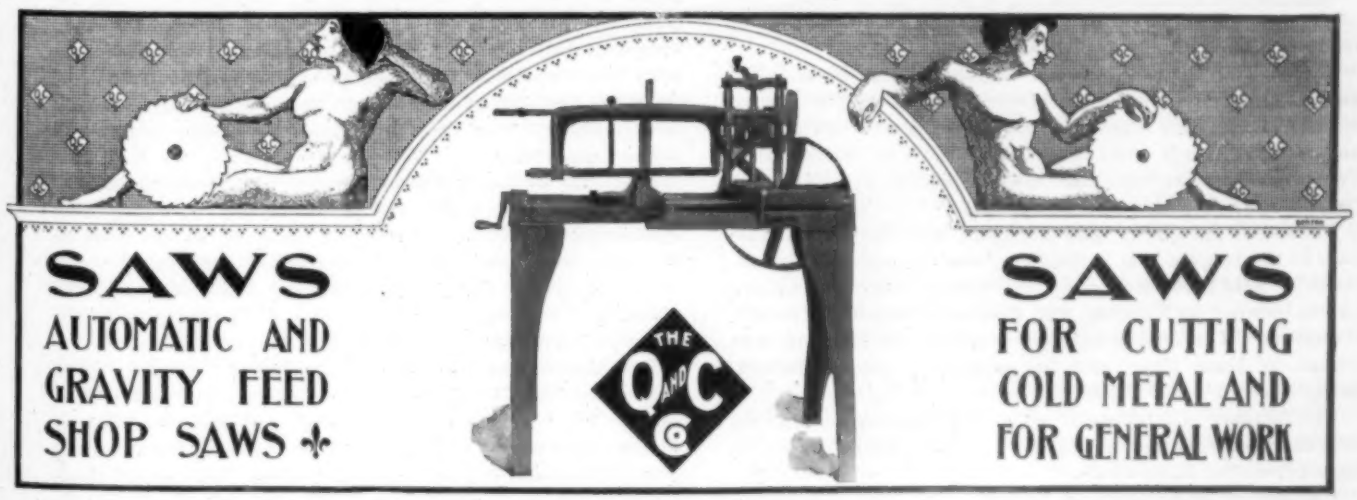
George B. Parker, of England, owner of the Carnegie furnace of Johnson City, Tenn., and the Embreville furnace at Embreville, has recently been making an inspection of the works with his new general manager, G. P. Perin. The Carnegie Furnace output has been increasd to 90 tons a day, while the Embreville Furnace, which has undergone extensive repairs, has an output of 120 tons per day.

The blast furnace of the Weston Furnace Co., of Manistique, Mich., has been sold to Joseph H. Berry, of the firm of Berry Bros., varnish manufacturers of Detroit. The furnace will be put in blast as soon as repairs can be made. The purchaser is largely interested in the Burrell Chemical plant, which adjoins the furnace property.

It is stated that both the Girard and Warren, O., mills of the Union Iron & Steel Co. have been transferred to the American Steel Hoop Co., along with the plant at Youngstown.

At Steelton, Pa., the number of men employed in March in the Pennsylvania Steel Co.'s plant was 6,241, a gain of 1,219 over March, 1898, and of 2,437 over the same month in 1897. The continued enlargement of the plant and the placing of the latest machinery greatly increases the output. Some delay is caused by a scarcity of Bessemer pig iron.

Sixteen of the 30 tin mills in the Shenango valley plant, at New Castle, Pa., of the American Tin Plate Co., were in operation last week, and this week additional mills are being run. There are six trains of five mills each and the end mill in each train is not to be started until the others have been working for some time. The tin house is now about com-



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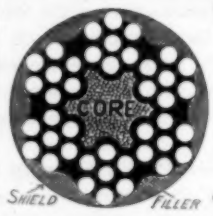

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pleted, and tinning operations will soon be commenced. The plates now rolled are being pickled, annealed and cold rolled, ready for the final pickling before tinning.

The old Hall furnace, between Sharon and Sharpsville, after an idleness of five years has been repaired, and is now in blast. The furnace is being operated by the Sharon Iron Co., and is making mill iron for local mills. The Sharon Iron Co. furnaces having been sold to the National Steel Co., left the rolling mills without an iron supply.

The sale of the Henry Clay furnaces and the Topton furnace to the Empire Iron & Steel Co., was completed last week, the price paid being $382,000. The Henry Clay furnaces are two in number, at Reading, Pa., and were owned by Eckert & Brother. The Topton furnace is at Topton, Pa., and was owned by Isaac Ekert and the estate of Henry S. Eckert, being leased to Isaac Eckert & Co.

The Salisbury Carbonate Iron Co., is preparing to start up the charcoal furnace at Copake Iron Works, P. O., N. Y., leased from the Miles estate.

The Bryant Iron Works, of Buffalo, have been put in the hands of a receiver. Affidavits by the directors state that the company has no tangible assets, and that $30,000 has been squandered during the past year for experiments. The company has been developing the Bryant molding machine. An order has been issued directing all persons interested to appear in court July 24 and show cause why the company should not be dissolved.

Judgment by confession was entered last week against the John Featherstone Sons, proprietors of the Columbia Iron Works, 354-358 North Halsted st., Chicago, for the sum of $35,279.01 in favor of the National Bank of America.

An order for 36 drilling and reaming machines has been placed by the Pressed Steel Car Co., of Pittsburg, with the National Pneumatic Tool Co., of Philadelphia.

The annual meeting of the stockholders of the Joseph Dixon Crucible Co. was held at the company's main office, Jersey City, N. J., April 17. Out of a possible vote of 7,345 shares, there were 7,069 shares voted for re-election of the old board, consisting of Edward C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alexander

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T. McGill, and Joseph D. Bedle. President E. F. C. Young; vice-president, and treasurer, John A Walker; secretary George E. Long, were re-elected by the directors. Judge Joseph D. Bedle, was also re-elected as counsel.

The Mary Pratt Furnace property, at Birmingham, Ala., embracing a furnace that has been idle for several years and 40 acres of ground, was sold to F. E. Nolting, for $50,000 cash. The Williams syndicate, of Richmond and Baltimore, is believed to be the purchaser. The syndicate also secured control of large tracts of coal and iron ore lands, costing $120 000.

An order has been issued for the sale of the Union Steel Co.'s plant, Alexandria. Ind., on May 6. The application comes from a number of creditors, who state that the plant is to become a part of the Republic Iron & Steel Co.

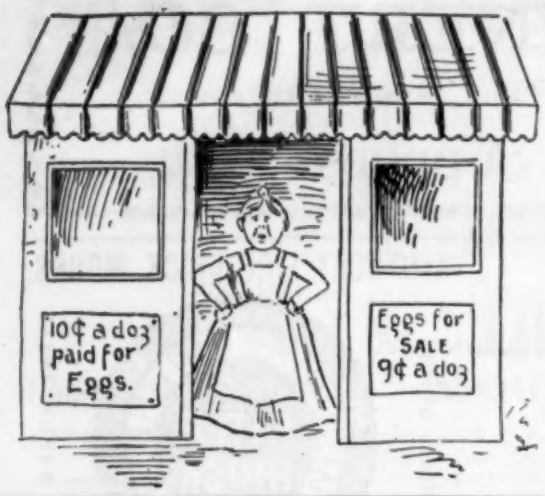
It is stated that the Tennessee Coal, Iron & Rail Road Co., has virtually sold its property in the Birmingham district to the Louisville & Nashville and the Southern Railway jointly, for $1,100,000. It is said that the Tennessee company can save, under this arrangement, about $150,000 a year, and that it will make an agreement for the use of the lines at a certain rate for a given period.

The iron ore properties at Wrightsville, Pa., idle for about ten years, have been put in operation. The Aurora Furnace at Wrightsville is now undergoing repairs preparatory to go in blast.

At the Kelley Nail & Iron Co.'s plant, at Ironton, O., the first wire was drawn by the new machines on April 19. A number of the new wire nail machines have also been started.

It is stated that the eastern stove manufacturers have lately advanced prices, 10 per cent, and have officially asked the stove manufacturers of the Pittsburg district to co-operate with them in maintaining prices, it being proposed that each observe the prices of the other when selling in that territory.

The Wrong Kind of "Figgering."



An old market woman used to buy her eggs for 10 cents a dozen and sell them for 9 cents a dozen.

"But how on earth can you make anything that way?" she was asked.

"Sure, by doin' a ver-r-ry large business."

I am afraid some men are running their foundries on a similar losing plan.

They lose more money buying supplies than they make as profit on their castings.

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It is hard enough and takes enough wear and tear on the brain and nerve to make it pay.

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I sell everything for the foundry. Just now **Molding Sand** claims attention, for this is the time of year when it is in the right condition to ship. Another thing of importance is my stock of **Plumbago** and **Talc.** It is worthy of attention. It's the pure quill. In these days of adulteration, misrepresentation, etc., a good, genuine article is an article of economy. If you don't believe this, let me send you samples.

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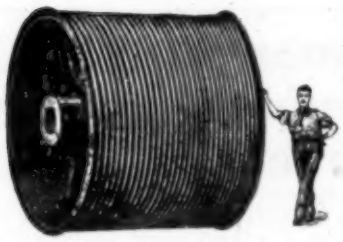

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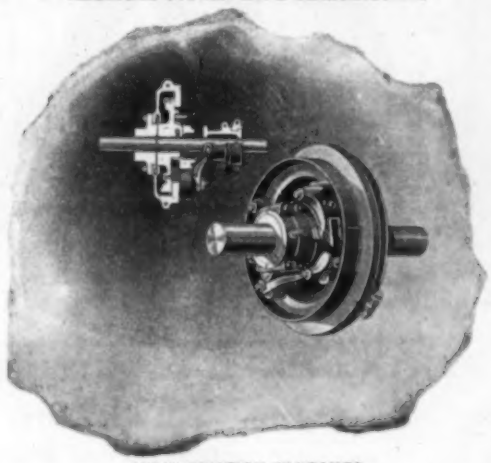

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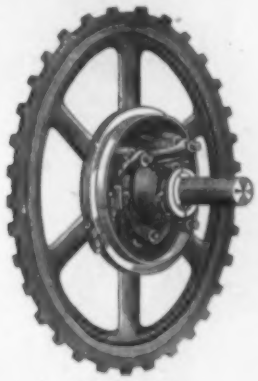

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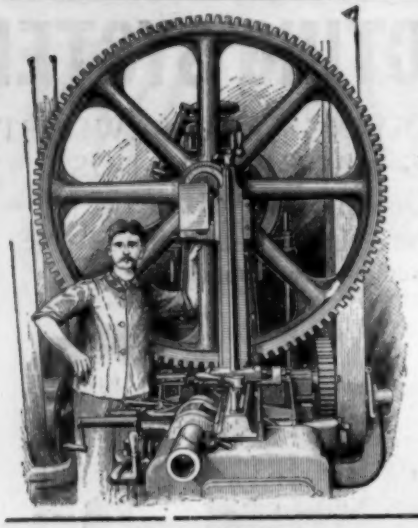

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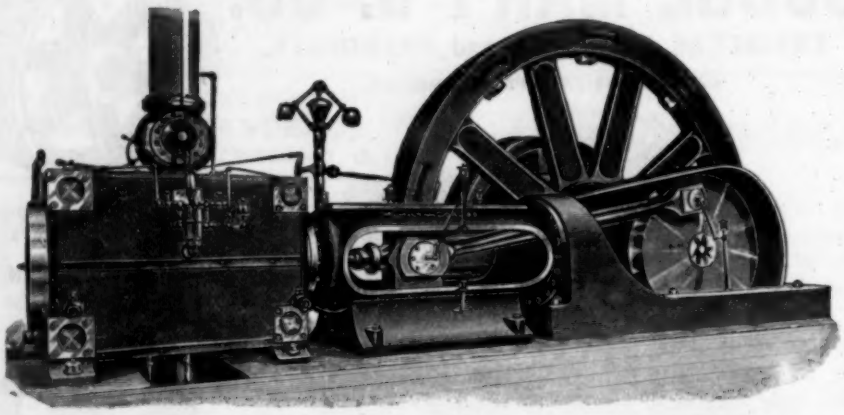

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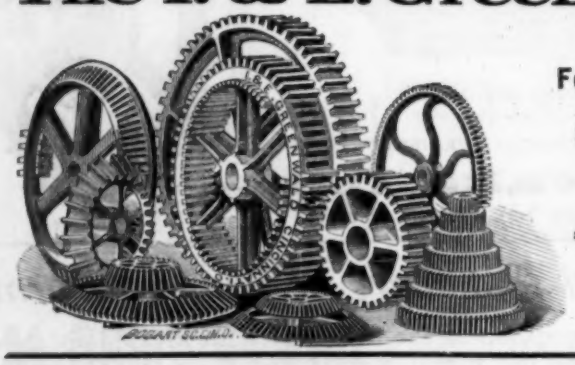

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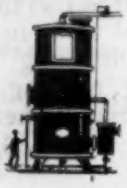

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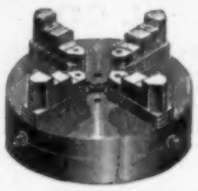

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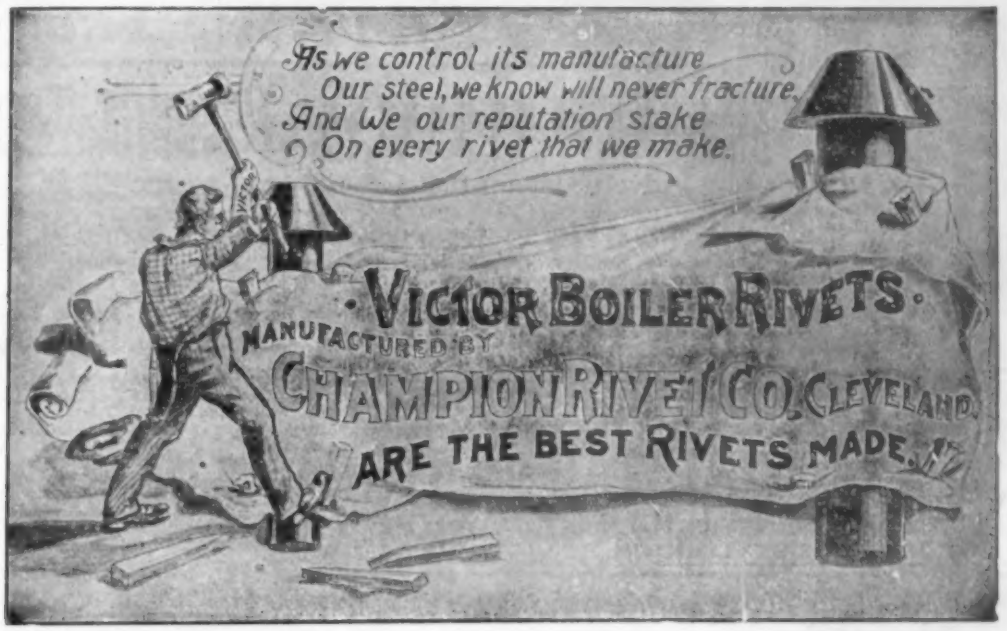
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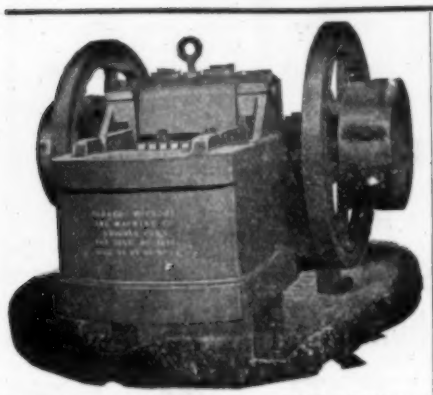

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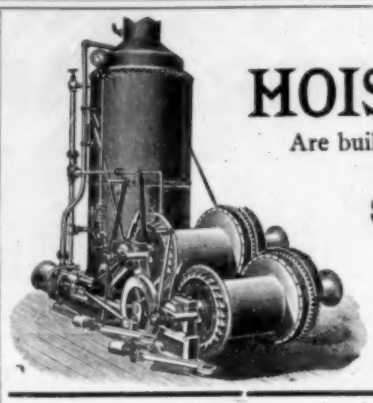

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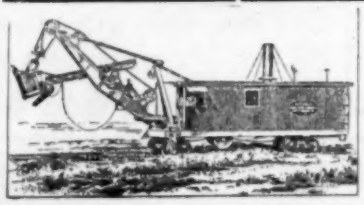

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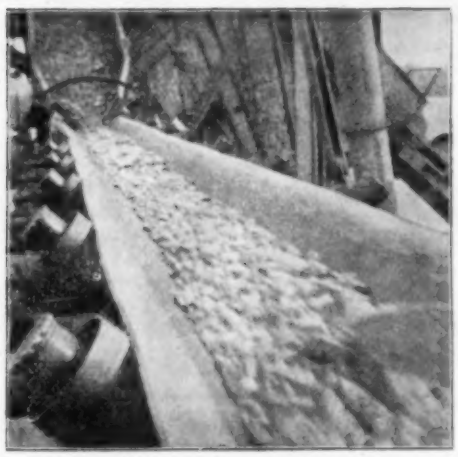

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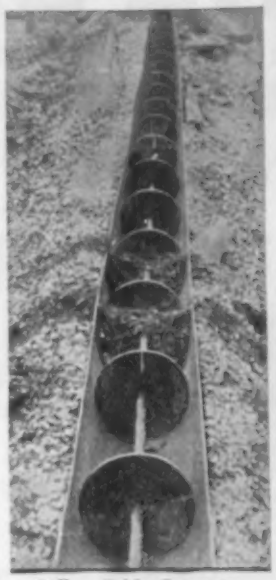

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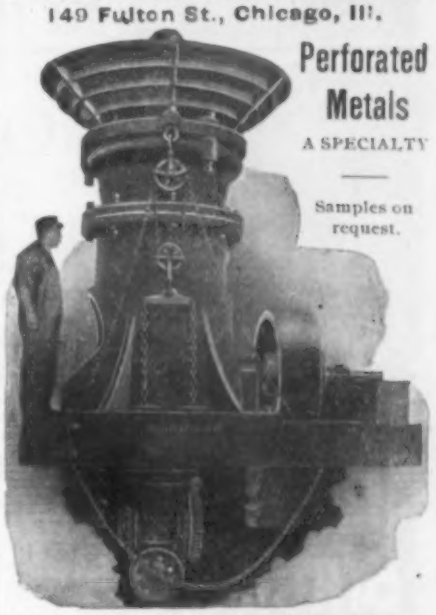

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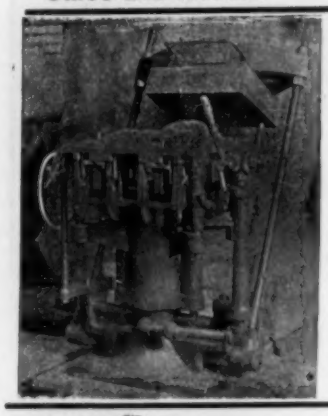

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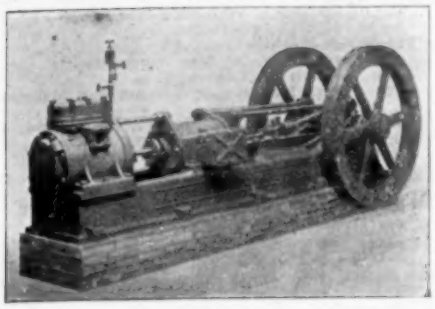

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Local Coke Foundry No. 3	14 50@14 75
Local Scotch Foundry No. 1	15 50@15 75
Local Scotch Foundry No. 2	15 00@15 50
Local Scotch Foundry No. 3	14 50@14 75
Southern Coke No. 1	16 00@16 25
Southern Coke No. 2	15 25@15 75
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Tennessee Charcoal No 1	15 00@16 00
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Southern Soft No. 2	14 75
Lake Superior Charcoal	14 00@14 50
Coke, Malleable	14 10
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Southern Coke No 1	$14 75
Southern Coke No. 2	14 25
Southern Coke No. 3	13 75
Southern Coke No. 4	13 55
Southern Gray Forge	13 20
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Old iron rails	$18 00
Old steel rails (6 ft. and over)	14 00
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	Net Tons
No. 1 R. R. wrought scrap	$16 50
Mill scrap	11 50
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Axle turnings	11 00
Wrought turnings (free from cast)	10 00
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Uncut wrought iron boilers	7 00
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Grate bars	8 00
Pipes and flues (clean)	10 00
Tank iron	12 00
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Beams and Channels (f. o. b. Cleveland)	1.50c
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Rounds and Squares.—Bar Iron.

1 to 1½	1.50 Base.
2 to 2½	.20 extra.
3 to 3½	.50 "
3½ to 4	.80 "
4¼ to 4½	1.00 "
4½ to 5	1.30 "
5¼ to 6	1.80 "
5¼ to 6¼	2.00 "

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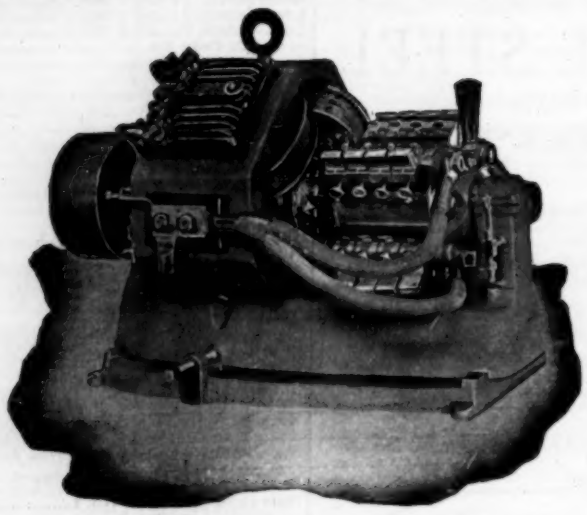

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6⅝ to 7¼	2.50 extra
¼ to ⅞	.10 "
⅝ to 11-16	.20 "
⅞ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13 2	.50 "
5-16 to / 32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1¼ to 4 x ⅜ to 1	1.05 Base
4¼ 0 6 x ⅜ to 1	.10 extra
6¼ 0 8 x ⅜ to 1	.60 "
8¼ 0 10 x ⅜ to 1	.80 "
1¾ 0 4 x 1 1-16 to 1¾	.30 "
4¼ to 6 x 1 1-16 to 1¾	.40 "
6¼ to 8 x 1 1-16 to 1¾	.60 "
8¼ to 10 x 1 1-16 to 1¾	.90 "
2 to 4 x 1⅜ to 2	.50 "
4¼ to 6 x 1⅜ to 2	.60 "
6¼ to 8 x 1⅜ to 2	.80 "
8¼ to 10 x 1⅜ to 2	1.00 "
2 to 4 x 2⅜ to 3	.60 "
4¼ to 6 x 2⅜ to 3	.80 "
6¼ to 8 x 2¾ to 3	1.00 "
1¾ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.20 "
¼ to 15-16 x ⅜ to ¼	.40 "
⅝ to 11-16 x ⅜ to ⅝	.50 "
½ to 9-16 x ⅜ to ½	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1⅝ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30 "
¾ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¼ to 4 x No. 9 to 3-16	.40 "
1¼ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40
⅜ x No. 9 to 3-16	1.50
⅜ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes o Light Bands.

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⅞ to 1½	.40 extra
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50 Base.
		Extras.
1¼ to 6,	" 10, 11, 12 or 1/4"	.05 per 100 lbs.
1 to 1⅜,	" 7, 8, 9 or 3-16"	.10 "
1 to 1⅜,	" 10, 11, 12 or 1/4"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or 1/4"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10, 11, 12 or 1/4"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10, 11, 12 or 1/4"	.45 "
½,	Nos. 7, 8, 9 or 3-16"	.55 "
½,	" 10, 11, 12 or 1/4"	.60 "
7-16	" 7, 8, 9 or 3-16"	.75 "
7-19	" 10, 11, 12 or 1/4"	.85 "
⅜,	" 7, 8, 9 or 3-16"	.95 "
⅜,	" 10, 11, 12 or 1/4"	1.05

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.	
7-16 to 3	Nos. 13, 14, 15 and 16	1.60 Base
		Extras.
7-16 to 2,	" 17, 18, and 19	.05 per 100 lb
7-16 to 2,	" 20	.10 "
7-16 to 2,	" 21	.15 "
7-16 to 1¼,	" 22	.25 "
¼ to 1¼,	" 13, 14 and 15	.05 "
¼ to 1¼,	" 16, 17 and 18	.10 "

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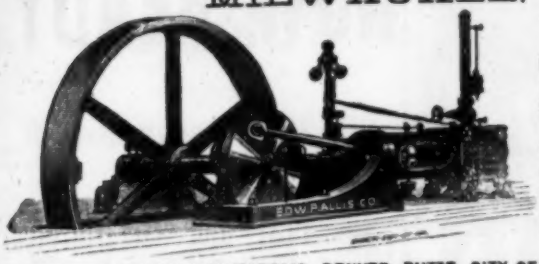

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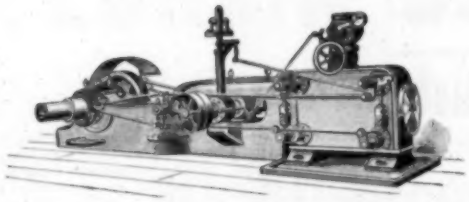

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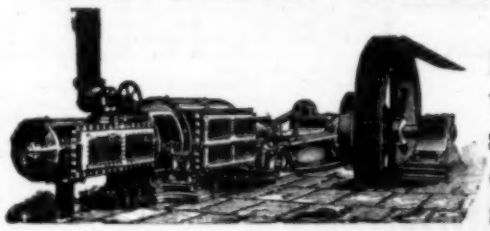

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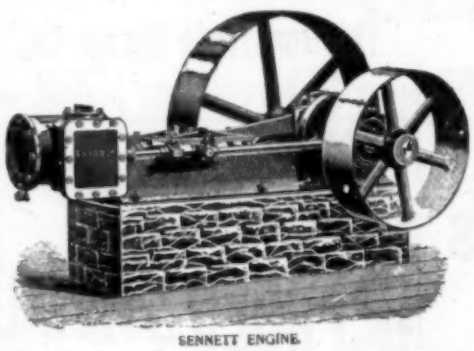

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1⅛ to 1¼,	"	21	.30	"
1⅛ to 1¼,	"	22	.30	"
15-16 and 1,	"	13, 14 and 15		"
15-16 and 1,	"	16, 17 and 18	.15	"
15-16 and 1,	"	19 and 20	.20	"
15-16 and 1,	"	21	.25	"
15-16 and 1,	"	22	.35	"
⅞,	Nos. 13, 14 and 15		.20	"
⅞,	" 16, 17 and 18		.25	"
⅞,	" 19 and 20		.30	"
⅞,	" 21		.35	"
⅞,	" 22		.45	"
¾ and 13-16	Nos. 13, 14 and 15		.30	"
¾ and 13-16	" 16, 17 and 18		.35	"
¾ and 13-16	" 19 and 20		.40	"
¾ and 13-16	" 21		.45	"
¾ and 13-16	" 22		.50	"
¾ and 13-16	" 23		.60	"
11-16,	Nos. 13, 14 and 15		.35	"
11-16,	" 16, 17 and 18		.40	"
11-16,	" 19 and 20		.50	"
11-16,	" 21		.60	"
11-16,	" 22		.70	"
11-16,	" 23		.80	"
⅝,	Nos. 13, 14 and 15		.40	"
⅝,	" 16, 17 and 18		.45	"
⅝,	" 19 and 20		.55	"
⅝,	" 21		.65	"
⅝,	" 22		.75	"
⅝,	" 23		.85	"
9-16,	" 13, 14 and 15		.45	"
9-16,	" 16, 17 and 18		.50	"
9-16,	" 19 and 20		.60	"
9-16,	" 21		.70	"
9-16,	" 22		.80	"
9-16,	" 23		.90	"
½,	" 13, 14 and 15		.55	"
½,	" 16, 17 and 18		.60	"
½,	" 19 and 20		.70	"
½,	" 21		.80	"
½,	" 22		.90	"
½,	" 23		1.00	"
7-16,	" 13, 14 and 15		.80	"
7-16,	" 16, 17 and 18		.90	"
7-16,	" 19 and 20		1.00	"
7/16,	" 13, 14 and 15		1.00	"
7/16,	" 16, 17 and 18		1.10	"
7/16,	" 19 and 20		1.20	"

Sheet Iron.

No. 10	2 25
No. 12	2 25
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No. 18	2 50
No. 20	2 70
No. 22-24	2 70
No. 25-26	2 80
No. 27	2 90

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Tank	2 25
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100 to 104 in. wide	2c. "
104 to 106 in. wide	special.

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½, ⅝, 11-16 and ¾ inches diameter	3 25
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Merchant pipe, from store	dis. 60 and three 10s		
Boiler tubes, 1¾ to 1½ inch	Discount		45
" " 1¾ to 2½ inch.	iron,	"	35
" " " "	steel,	"	60
" " 2¾ to 4 inch,	iron,	"	60
" " " "	steel,	"	62½
Casing, screw and socket joint		"	30
Casing, inserted joint		"	45

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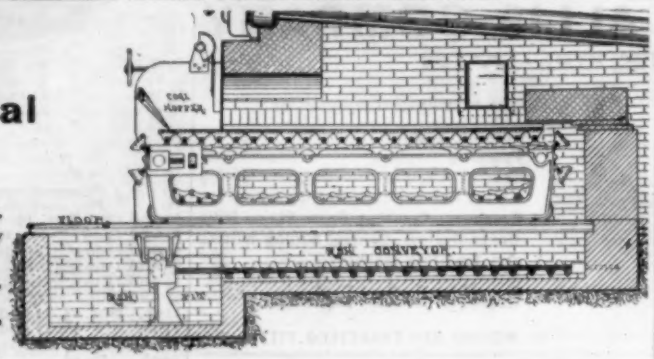

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SECOND EDITION

OF

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Tables, Formulas and Information for the use of Chemists, Metallurgists and Mining Engineers. . . . . .

BY

J. H. CREMER, M. E.,

AND

G. A. BICKNELL, M. S.

EXTRACT FROM PREFACE:

In the preparation of the second edition of our Handbook, the general plan of the first edition has been followed, viz., to present in concise form such data and information as are useful to the chemist and metallurgist. Several tables of the first edition, which were of somewhat limited use, have been omitted, while more than one hundred pages of new matter have been added.

The methods for analysis of iron ore, iron and steel and for assaying have been given briefly, but perhaps as much in detail as is consistent with the general scope of the book. Several changes and additions to the Specific Gravity tables have been made by adoption of later and more accurate values.

In the notes on blast furnace practice have been outlined the more important theoretical and practical points, which, it is hoped, will be of some service to those interested in the manufacture of iron.

The hygrometric table gives the necessary information for determining the amount of moisture in air, a subject whose importance in metallurgical operations is being more fully recognized at present than heretofore. This table is new and is based on the most accurate data available at the present time

The tables of weights and measures, United States and foreign, have been very much amplified, and the conversion tables for United States and metric weight and measures of the U. S. Coast and Geodetic Survey included, the latter being based on the legal standard for this country.

Numerous miscellaneous tables have been added, which, it is hoped, will be found of value

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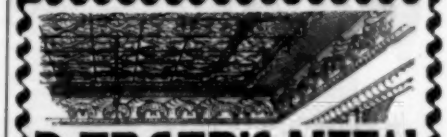

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	Arrive.	Depart.
Valley Jctn. & Way Stations..	*6:25 P M	*7:25 A M
Marietta, Wheeling & Chicago	†9:25 P M	†7:25 A M
Cleveland Press Special.....	†9:25 P M	†2:00 P M
Akron, Canton & Wheeling...	*10:20 A M	*3:30 P M
Akron, Canton & Chicago.....	*8:05 A M	*6:35 P M
Akron, Canton & Marietta,...	†2:10 P M	†11:00 A M
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Time Table effective May 15th, 1898.
Cleveland Depot: Foot of South Water Street.
Elyria Depot: Huron St., West Side.

South Bound.			Central Standard. Lorain Branch	North Bound.		
15	13	11	LV. AR.	12	14	16
P.M.	P.M.	A.M.		A.M.	A.M.	P.M.
4:25	2:25	6:27	Lorain	9:15	11:35	7:30
4:40	2:30	6:44	Elyria.....	9:00	11:21	7:16
4:56	2:55	7:04	Grafton	8:43	11:07	6:58
5:13	3:12	7:23	Lester.....	8:25	10:50	6:40
5	3	1	Main Line	2	4	6
5:30	2:25	7:20	Cleveland	8:30	11:50	7:15
5:47	2:41	7:36	Brooklyn	8:14	11:34	7:01
6:42	3:26	8:22	Lester.....	7:29	10:49	6:19
6:52	3:35	8:30	Medina.....	7:16	10:37	6:07
7:05	3:46	8:41	Chippewa La	7:04	10:26	5:55
7:20	4:01	8:56	Sterling.....	6:48	10:12	5:40
8:09	4:46	9:45	Massillon	6:00	9:23	4:54
8:55	5:31	10:34	Canal Dover.	5:11	8:36	4:10
9:02	5:38	10:41	New Philade	5:04	8:28	4:03
9:20	6:05	11:25	Uhrichsville	4:45	8:10	3:45
.....	8:10	1:30	Bridgeport ...	.....	6:05	1:40
.....	8:25	.....	Bellaire.....	.....	5:50	.....
P.M.	P.M.	P.M.	AR. LV.	A.M.	A.M.	P.M.

No. 9 leaves Lorain 9:50 a.m., Elyria 10:05, Grafton 10:21; arrives Lester Junction 10:40. No. 10 leaves Lester Junction 3:25 p.m., Grafton 3:42, Elyria 3:57; arrive Lorain at 4:10 p.m.

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The lists of Plate and Sheet Mills and of Tin Plate and Stamping Works are much more complete than in previous editions. The names and location of all the works described are given in alphabetical order, followed by a description o their character, capacity and products, with the names of the principal officers, etc., including the names of selling agents. This edition makes a cloth-bound book of nearly 400 well-printed pages—many more than in any previous edition. It contains a complete list of all the

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Stamping Works,
Forges and Bloomaries,
Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
Malleable Iron Works,
Cast Iron Pipe Works,
Cast Iron Soil and Plumbers' Pipe Works,
Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
Bolt, Nut and Rivet Works,
Car Axle Works,
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Car Builders in the United States

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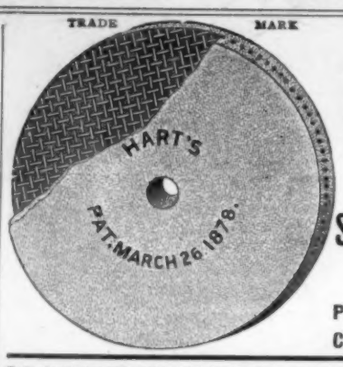

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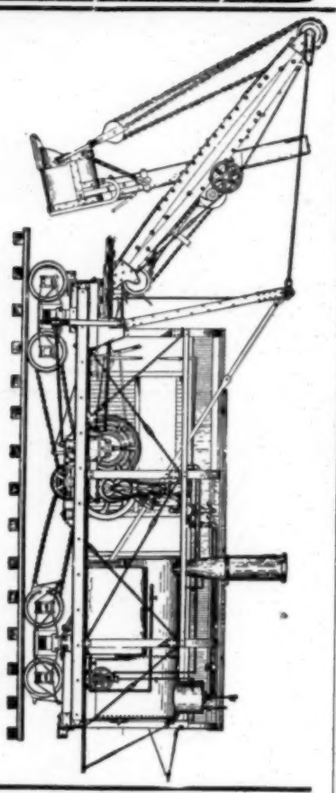

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